OFFICIAL PUBLICATION OF THE PROCEEDINGS AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

VOLUME 44, NO. 4
FEBRUARY 14, 1955

AMERICAN DYESTUFF REPORTER

Devoted to Textile Chemistry
BLEACHING • DYEING • PRINTING • FINISHING

Du Pont "LATYL" Dyes for fast colors on "DACRON"

Specially developed for "DACRON" polyester fiber, the Du Pont family of "LATYL" dyes have excellent light and wet fastness properties. Du Pont "LATYL" dyes are useful in pale shades on acetate, too, where they show exceptional fastness to sunlight and atmospheric fading.

Application of "LATYL" dyes is similar to that for conventional disperse dyes, with which they are fully compatible in compound shades. Here is a rainbow of color—for "DACRON" and for blends of "DACRON" and other fibers.

For more information and technical help, feel free to call on Du Pont's technical service—at: E. I. du Pont de Nemours & Co. (Inc.), Dyes and Chemicals Division, Wilmington 98, Delaware.

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DU PONT *Du Pont Dyes*

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sequestering agents offer complete

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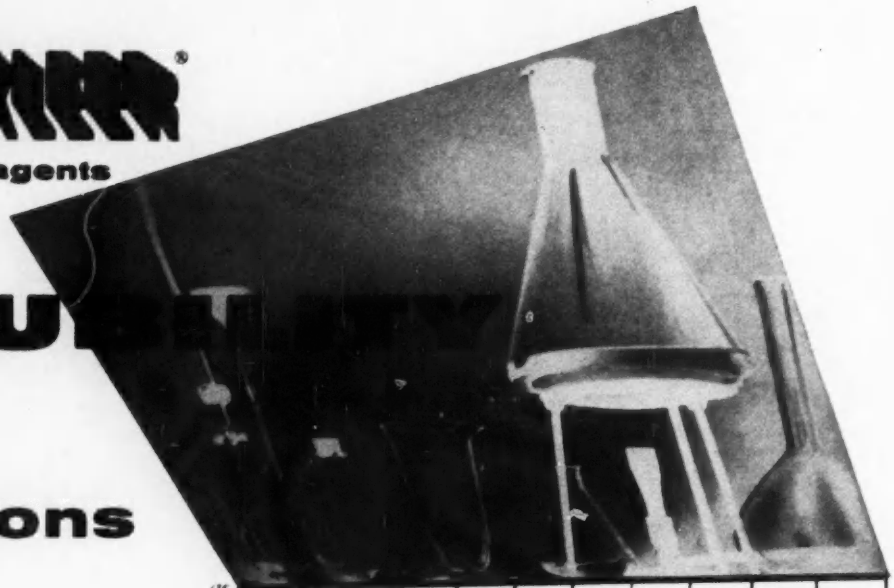

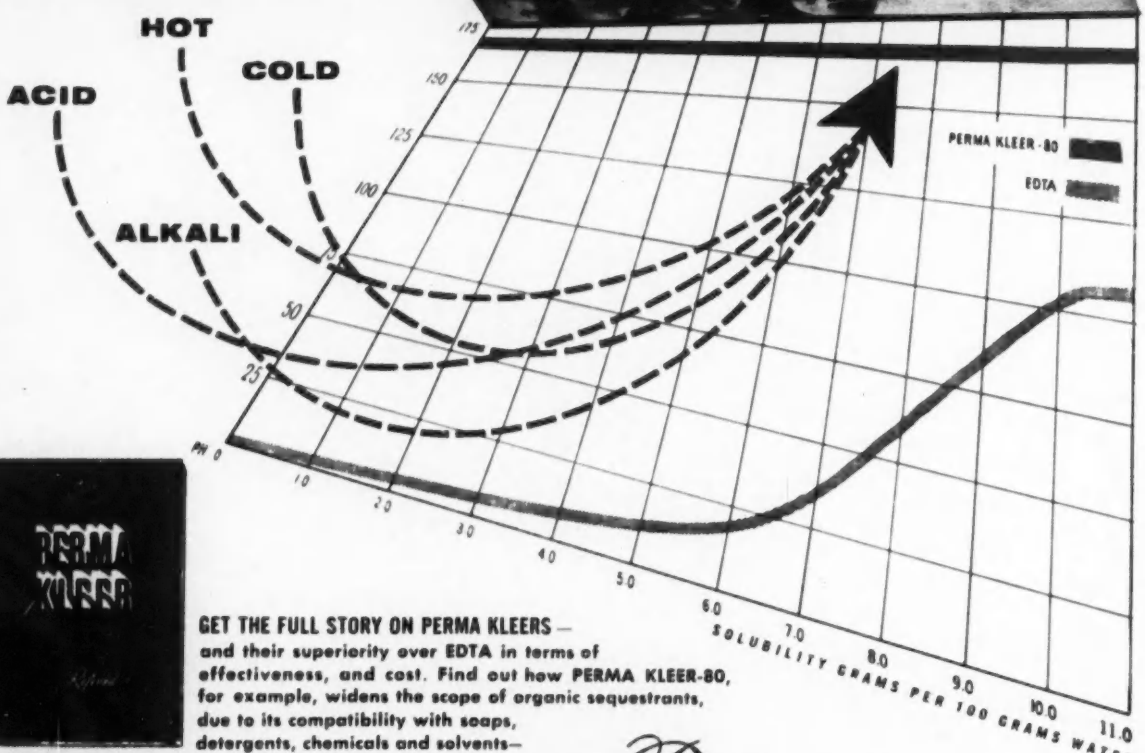

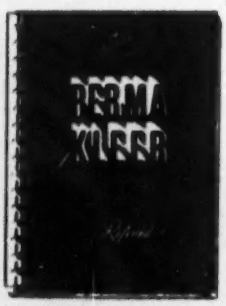

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WE'RE MOVING!

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FADE-OMETERS . . .
WEATHER-OMETERS . . .
LAUNDER-OMETERS . . .

are moving February 15, 1955,
to the new Atlas Plant at
4114 North Ravenswood Avenue,
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This entire building will be occupied by Atlas Electric Devices Co. for the manufacturing, testing, and research work of Fade-Ometers, Weather-Ometers, Launder-Ometers, Atlas Scorch Testers, and the Atlas Accelerator. After February 15, 1955, address all communications to the new address.

ATLAS ELECTRIC DEVICES CO.

4114 N. Ravenswood Ave., Chicago 13, Illinois, U.S.A.
Telephone EAstgate 7-4520

Sales Representatives:

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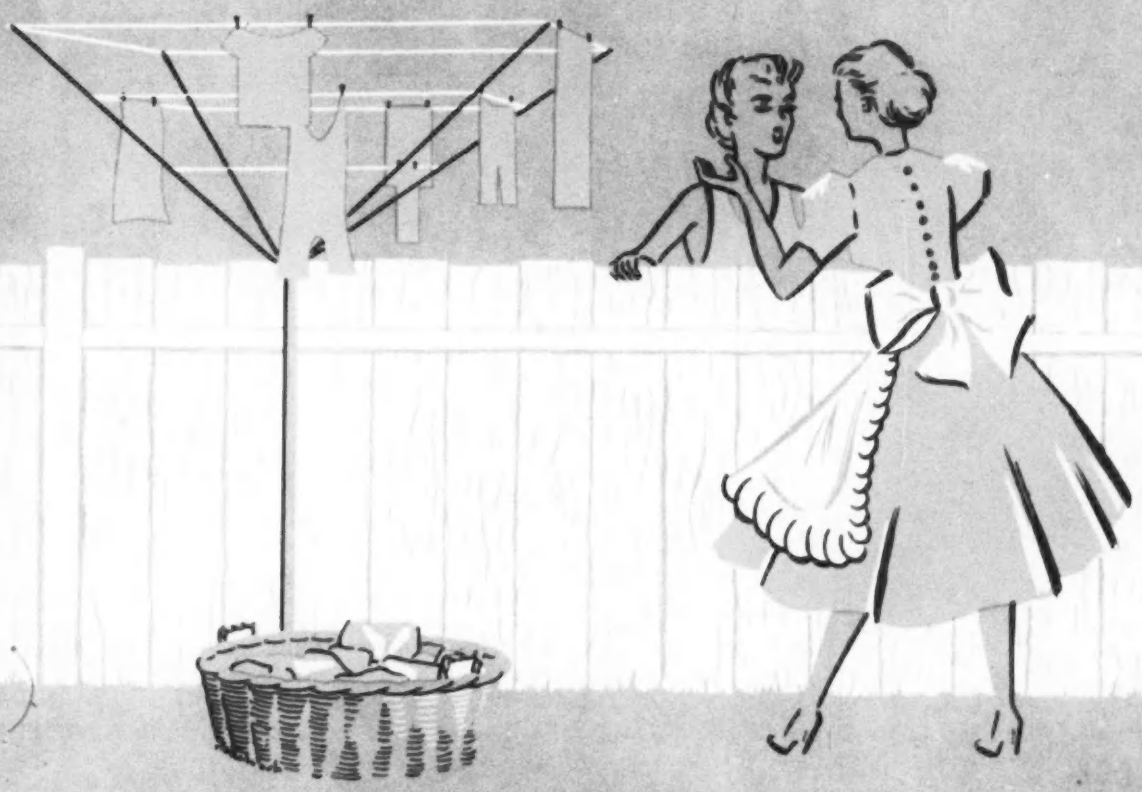
and other principal cities throughout the world.

American Dyestuff Reporter, Vol. 44, No. 4, February 14, 1955. Published every other Monday. Copyright 1955, by Howes Publishing Co., Inc., 44 E. 23rd St., New York 10, N. Y. Domestic subscription, $7.50; Canadian, $8.50; Foreign, $15.00. Effective Dec. 1, 1954. Entered as second-class matter Nov. 6, 1919, at the New York, N. Y., Post Office under the act of March 3, 1879.

What won't "come out in the wash"?

NATIONAL CARBANTHRENE YELLOW PG
DOUBLE PASTE



For cottons and rayons that must withstand very rigorous laundering and wet processing, NATIONAL CARBANTHRENE YELLOW PG has an excellent combination of fastness properties.

Producing reddish-yellow shades of medium brightness, this anthraquinone vat dye has exceptionally good fastness to commercial laundering and to all wet-processing steps including boiling soap, chlorine and peroxide bleaching, stoving, mercerizing, acids, alkalis, cross dyeing, perspiration, water, sea water, hot pressing and dry cleaning. It also possesses good to very good light fastness which is further improved by resin finishing for crease resistance.

NATIONAL CARBANTHRENE YELLOW PG can be applied to cotton and rayon in any form by reduced dyeing, pad-jig, pressure dyeing, etc. It is promptly available from National's nearby warehouse stocks.

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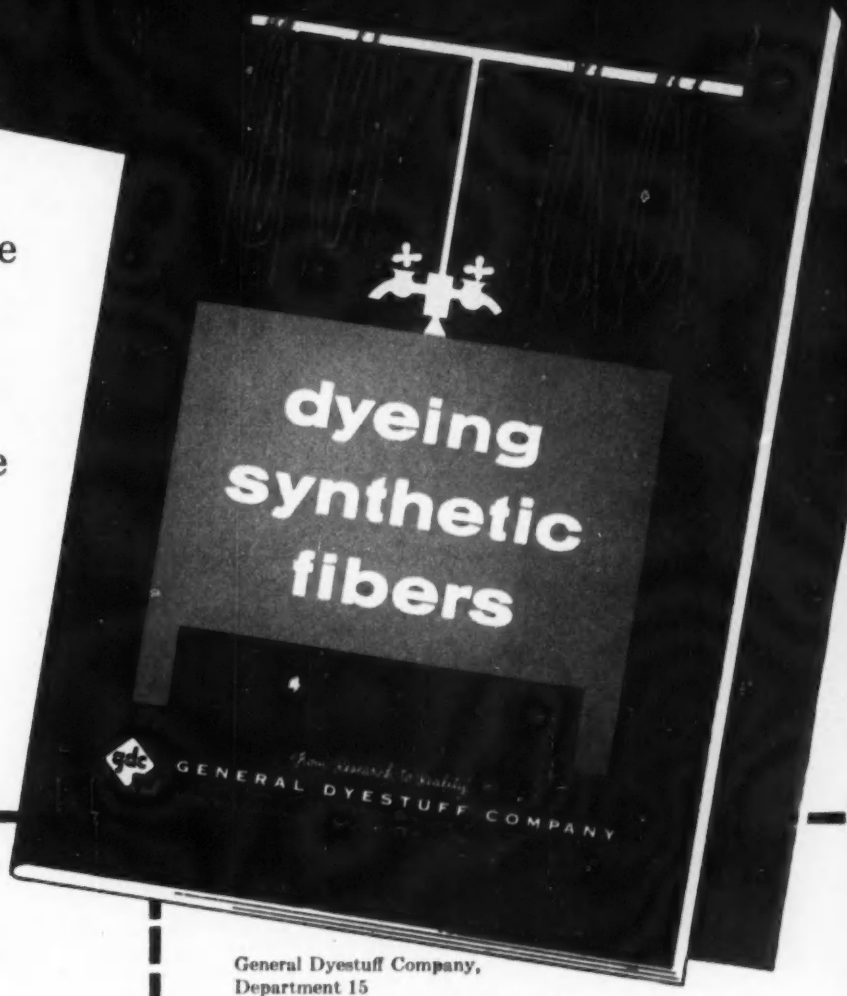

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NEW FABRIC SOFTENER!

Only 0.2% in bath fluffs up nap like magic—gives all fabrics an amazingly soft hand!

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Only 0.2% of Arquad 2HT gives all fabrics anti-static properties and extra smoothness with no oiliness or discoloration. Fabrics rinsed with Arquad 2HT also resist dirt, dry faster, are easier to handle.

Send the coupon for a free sample and try Arquad 2HT yourself. When you see what it can do, you'll know it's a must for your mill! Cash in on softer fabrics now—send today for Arquad 2HT!

Makes stiff fabrics **SOFT!**

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IN A SINGLE YEAR!

Woolen mills in increasing numbers are reporting important savings in their processing costs—and more saleable fabrics—after changing to Kyro AC, a new type of modified amine condensate product with soap-like action on wool. Here is a typical example:

GIVES MORE SALEABLE FABRICS, TOO!

$5600 SAVED
through a 15% reduction of fulling time

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through a 40% reduction in flocking

$7500 SAVED
through the lower initial cost of Kyro AC

We welcome the opportunity to show how Kyro AC can effect similar savings in your mill. Get the full story of Kyro AC from your Procter & Gamble salesman, or drop a line to

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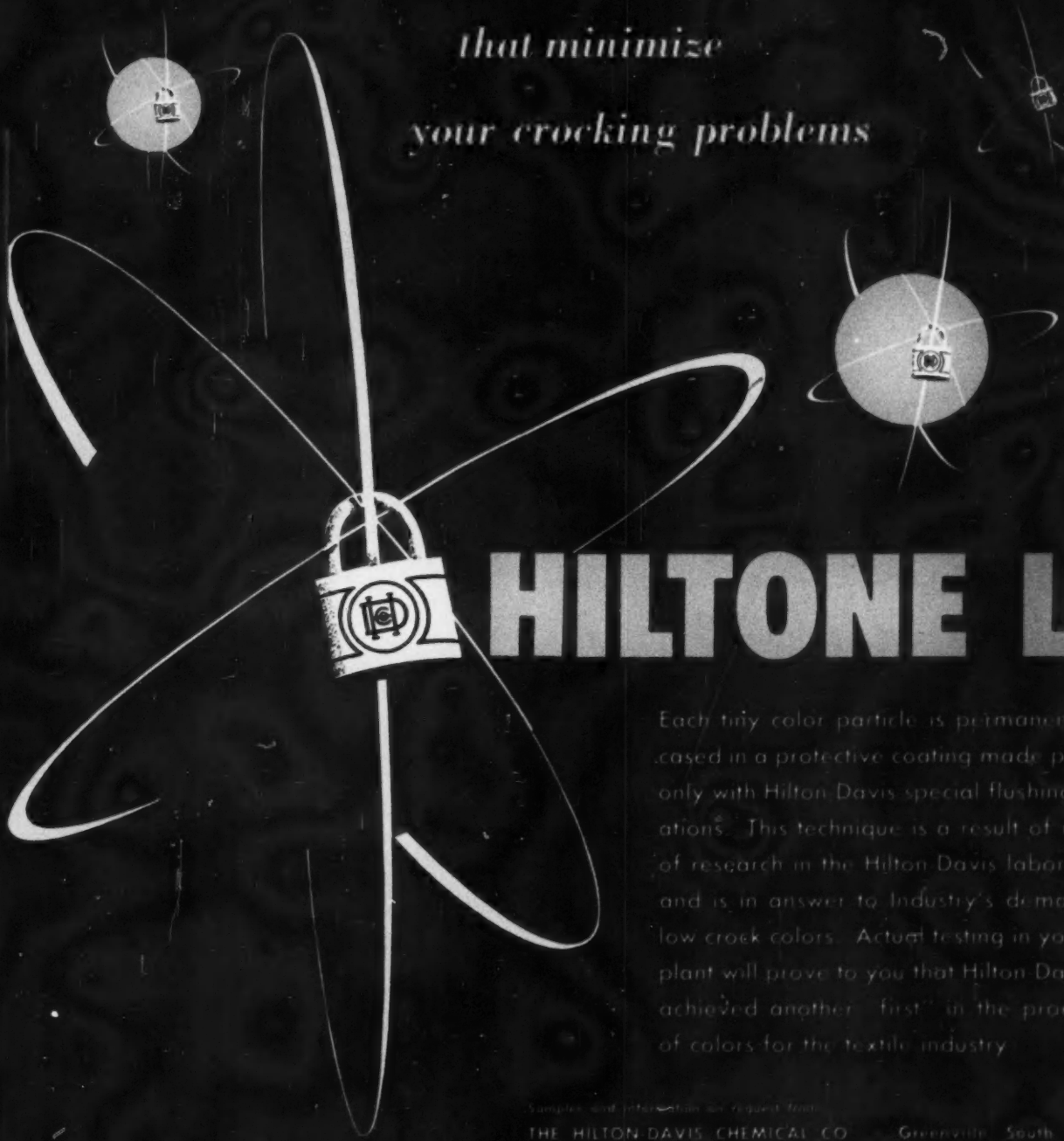
Makers of Profine, Kyro AC, Olate, Proxol, Proxol-T and Orvus products.

● Have you received a copy of our recently published booklet on Fulling and Scouring Wool Fabrics? A postcard request will bring it to you.

now locked-in printing colors

that minimize

your crocking problems



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Each tiny color particle is permanently encased in a protective coating made possible only with Hilton Davis special flushing operations. This technique is a result of months of research in the Hilton Davis laboratories and is in answer to Industry's demand for low crock colors. Actual testing in your own plant will prove to you that Hilton Davis has achieved another "first" in the production of colors for the textile industry.

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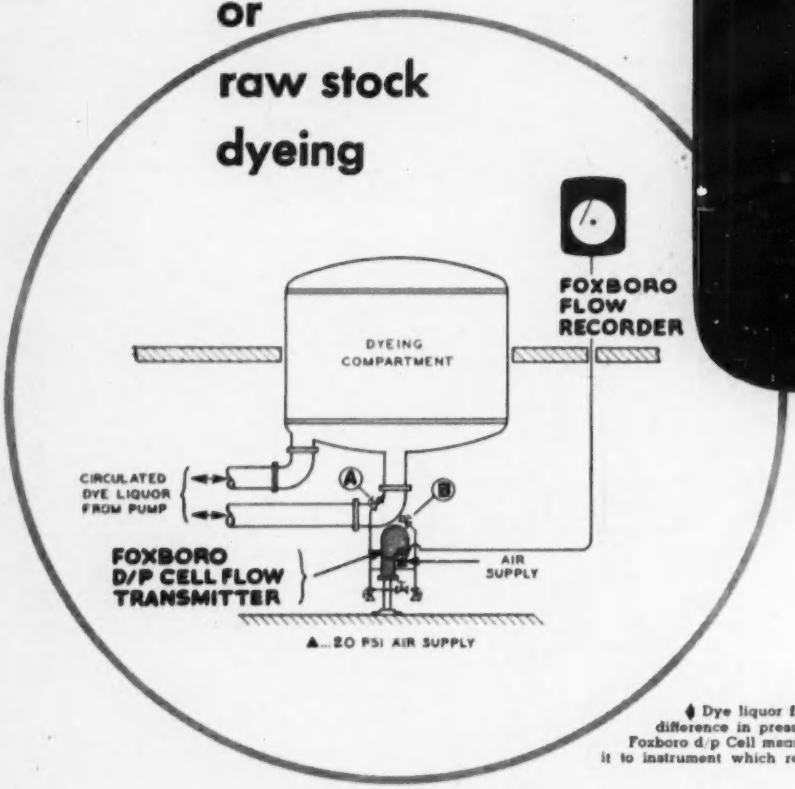
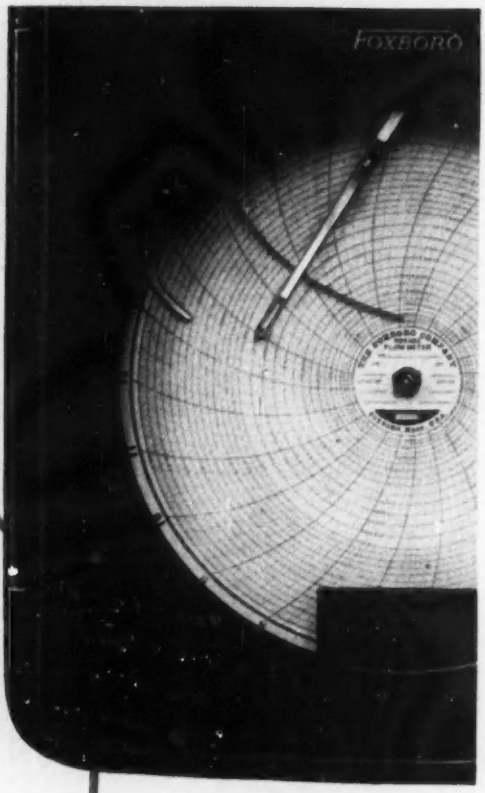
Manufacturers of Dyestuffs for the Textile Industry

Know your flow... Reproduce flow rates

...in beam, package, or raw stock dyeing





NEW!

Fully Automatic Flow Control, *tried and proved*, now available. Send for details.

◆ Dye liquor flowing in either direction creates a difference in pressure between elbow taps A and B. Foxboro d/p Cell measures this differential and transmits it to instrument which records flow in gallons per minute.

WITH FOXBORO DYE LIQUOR FLOW MEASUREMENT you can record both outside-in and inside-out flow in your recirculating-type dyeing machines . . . *with no restriction to the flow.*

Chart record in gallons per minute makes it easy to standardize flow rates per pound of yarn in accordance with dyestuff specifications.

On beam-type machines, varying density can be compensated for with far less danger of "blowing" a beam. Method can also be used to measure individual flows on multiple kier machines.

This new Foxboro System for dye liquor flow measurement can be installed on any recirculating-type dye machine . . . normally without any modification of your equipment. For complete information, write for Engineering Data Sheet 220-52 and installation photographs.

THE FOXBORO COMPANY, 292 NORFOLK ST., FOXBORO, MASSACHUSETTS, U.S.A.

FOXBORO
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DYE LIQUOR FLOW MEASUREMENT

FACTORIES IN THE UNITED STATES, CANADA, AND ENGLAND

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AHCOVAT BROWN 4R-BR-AR-6R

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YELLOWS
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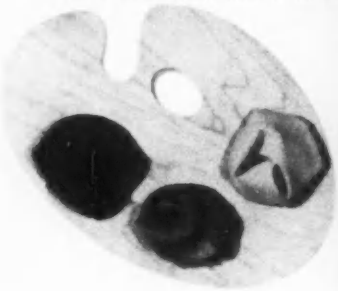

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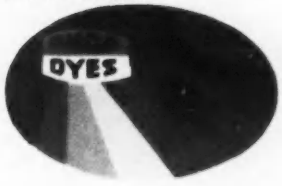
Quality 

Integrity

	Mechanical Stability in Seconds	ACID-SALT TOLERANCE IN C.C. PER 100 PARTS LATEX SOLIDS				
		NA_2SO_3, 10%	HCl, 10%	H_2SO_4, 50%	NaCl, 10%	CH_3COOH, 50%
CHEMIGUM Latex 235 CHS	300+	500+	84	78	500+	500+
CHEMIGUM Latex 245 CHS	300+	500+	88	80	500+	500+
Latex "A"	1	82	27	40	58	9
Latex "B"	14	352	20	20	40	500+
Latex "C"	3	44	8	8	24	19

CRITICAL TEST of latex mechanical stability—as described in RFC Rubber Reserve Division Report SP-T 153—shows CHEMIGUM Latex is superior to similar latices as indicated by the data.

GREATER STABILITY MAKES IT EASIER

to improve fabrics with CHEMIGUM LATEX

ONE of the few problems involved in making sizes, finishes, binders and adhesives based on latex is the relative instability of the vehicle. Too much mechanical working or agitation or too high a concentration of acid-salts in the formulation can coagulate the latex. With CHEMIGUM Latex, the problem is minimized.

CHEMIGUM Latex is an aqueous dispersion of a butadiene-acrylonitrile copolymer that has found wide application in the textile field. Excellent mechanical stability and high acid-salt tolerance broaden its possibilities and simplify its use. But these are only two of its interesting properties.

Permanence, strength, adhesion, flexibility, abrasion-resistance and resistance to oils, greases, soaps, solvents and detergents are some of the features of CHEMIGUM Latex that have helped many manufacturers to sales-worthy product improvements or entirely new products. How can they help you? Details and technical assistance are yours by writing to:

Goodyear, Chemical Division, Akron 16, Ohio

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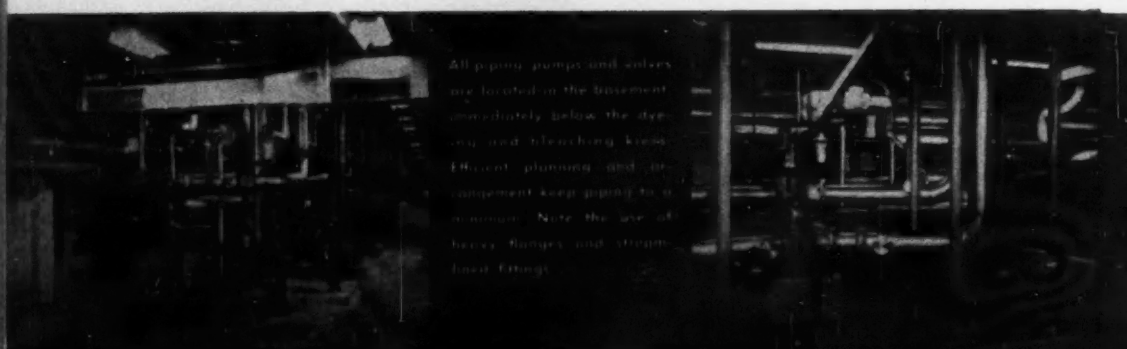
Use-Proved Products—CHEMIGUM • PLIOBOND • PLIOLITE • PLIO-TUF • PLIOVIC • WING-CHEMICALS—The Finest Chemicals for Industry

SMITH-DRUM

Installation of Package

Partial view of main dyehouse, showing dyeing machines in tandem to handle 1200 lb. batches. Package carriers in foreground are shown on trucks ready for loading. All floor openings were preformed when pouring concrete floor and are sealed to prevent seepage to the floor below. Note the clear work areas.



Completes World's Largest, Most Modern Dyeing, Bleaching and Drying Equipment

at Coats and Clark's New Toccoa Plant

Working in close coordination with the engineering staff of Coats and Clark, Inc. and their architects, Smith-Drum engineers have recently completed installation of equipment in the finest yarn processing plant in the world. We congratulate the far-sighted management of Coats and Clark for their long-range planning, which made it possible for the equipment and the building itself to be designed as a completely integrated plant. In no other way could the high degree of operating efficiency have been achieved. Smith-Drum engineers duplicated the physical layout in their own plant so that, on delivery, the machines were installed without any building changes.

The *Smith-Drum* equipment included 26 kiers for dyeing and bleaching, with complementary extracting and drying machines . . . as well as a battery of small lot and sampling units. All have automatically controlled indirect heating and cooling. All are capable of operating at temperatures up to 300° F. and all vessels are ASME approved.

These photographs show the careful planning which provides for one-way flow of production, with no back-tracking of work. They show proper placement, so that all work areas are clear of obstructions . . . and far-sighted allowance for expansion and addition of equipment. They show how maximum production is being achieved with a minimum of operators, through the use of highly automatic, but simple, controls.

All of these factors play important parts in making it possible for this new plant of Coats and Clark, at Toccoa, Georgia, to produce more processed high quality yarn at lower cost than any other plant of its kind in existence.

This same engineering skill and intimate knowledge of dye-house problems is available to every processor of yarn . . . whether your production calls for *one* kier or *twenty-six* or more. We invite you to consult with our engineers on *any* dyeing, bleaching, extracting or drying problem . . . large or small.

SMITH, DRUM & COMPANY

432 W. Allegheny Ave., Philadelphia 33, Pa.

Southern Sales Representatives: **PARROTT AND BALLENTINE**

510 South Carolina National Bank Bldg., Greenville, South Carolina

This shows a row of Combination Air Pressure Extractor-Dryers in the foreground. Packages are placed in these kiers on the same carriers on which they are dyed, a great saving in both handling costs and time. One man operates eight machines.

Yarn carriers are handled by an overhead crane system which speeds loading and unloading of all kiers. This, plus fully automatic controls make it possible for one operator to handle many of these machines. Note the use of special spring wound packages, another new development.

DEPEND ON "VIRGINIA" SODIUM HYDRO

for easy and accurate duplication of difficult shades in your dyeing operations

Matching shades comes easier when the reducing power of the hydro is uniform from vat to vat. Whether the material be raw stock, yarn or piece goods, dyers attest to this reliable property of concentrated "Virginia" Sodium Hydro.

This is the product that is

- Uniformly crystalline
- Free-flowing
- Quickly water-soluble
- Stable in storage and solution

Prove to yourself that there is a difference. Ask for a test sample, or, if you prefer, one of our technical men will visit you.

Perhaps you'll be interested, too, in the "Virginia" engineered equipment which automatically feeds hydro to the dye bath in accurately measured amounts. Write us today.

Let us develop a profitable application of our hydro in your plant.

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Emboset

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RESIN SERIES

NEW DEVELOPMENTS!

For the Finest Stabilizing, Crease Proofing, Embossing and Glazed Chintz Effects

Emboset LOCLOR

LOW CHLORINE RETENTION. Produces crush resistant and stabilized effects on cottons and rayon. Emboset Loclor is one of the lowest chlorine retentive resins on the market today. Wherever fabrics are subjected to washing and bleaching . . . this is your resin! Low chlorine retention keeps yellowing and tensile strength losses at a minimum. The resulting finish is wash resistant, crease resistant and fully stabilized. A durable resin which produces highly efficient mechanical effects.

Emboset B

SOFT HAND FOR SYNTHETICS, COTTONS and MIXTURES. A liquid stabilizing and crush proofing resin with a high shelf life. Easiest resin you ever used . . . extremely economical. Produces soft hand with superior fastness properties, crease resistance and shrinkage control. Very compatible with other resins. Applicable to synthetics and mixtures. Durable . . . produces highly efficient mechanical effects.

Emboset N R

FIRM AND FULL HAND. A crease proofing, stabilizing liquid resin that produces firmness, resiliency and shrinkage control on hydrophobic fibers such as acetate, orlon, dacron, nylon, etc. Especially good for heavy nylon shoe cloth, or for nylon blouse finishes where a firm, resilient hand is required. Economical and easy to run. Comparatively easy to cure . . . has high shelf life. Durable . . . produces highly efficient mechanical effects.

Technical data on the new Emboset Series available on request. Test runs arranged at your convenience.

METRO-ATLANTIC INC.

Manufacturers of Chemicals, Dyes and Intermediates

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Developments in Color Measurement

THE G-E RECORDING SPECTROPHOTOMETER IS IDEAL FOR COLOR CONTROL OF DYES AND DYING OF ALL TEXTILE PRODUCTS. WITH

G-E Spectrophotometer Helps in Protecting

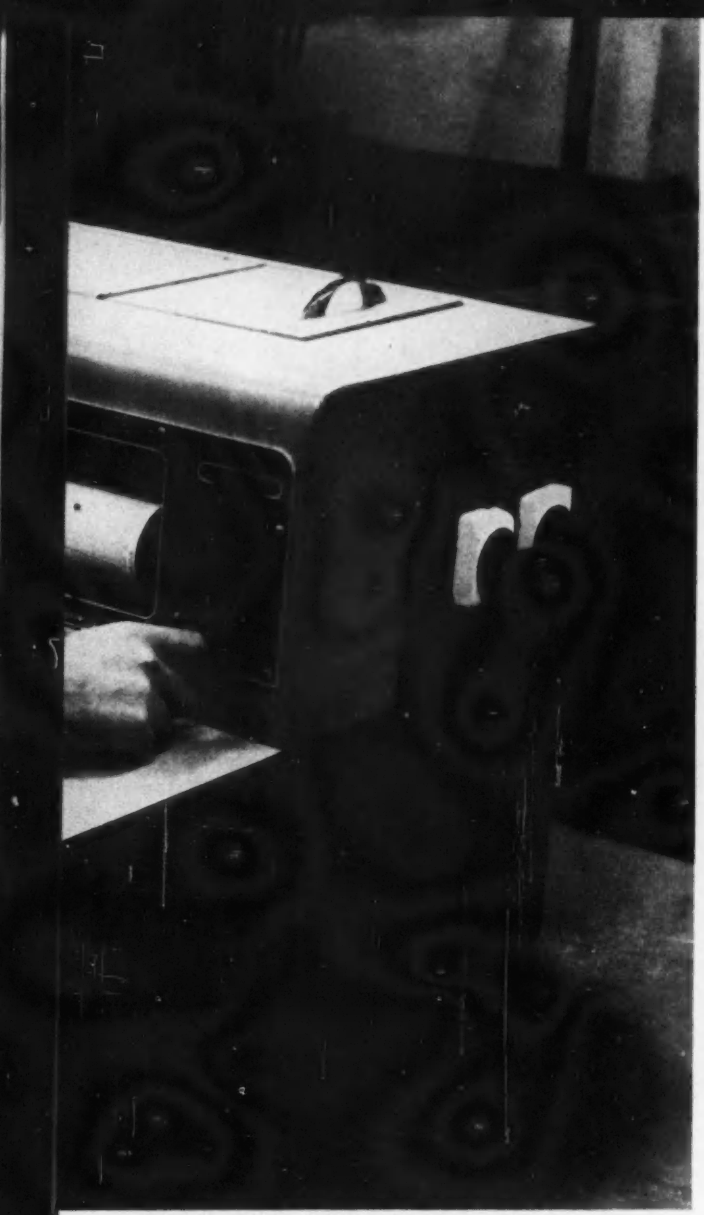
General Electric spectrophotometers and integrators are at work 24 hours a day maintaining accurate color tolerance at the Mohawk Carpet Mills' plant in Amsterdam, New York.

Used both in the laboratory and in dye house operations, this recording instrument provides Mohawk technicians with colorimetry coefficients and a permanent chart of any test sample. From this information, the carpet stock dyers can easily adjust the quantities of dyestuff needed to achieve the desired high standards.

JOHN J. HANLON, Technical Director of Mohawk Carpet Mills, says: "Coupled with our dyers' exper-

Progress Is Our Most Important Product

GENERAL ELECTRIC



THE INSTRUMENT, COLORS CAN BE MATCHED WITH CERTAINTY.

AFTER CHECKING yarn sample on spectrophotometer, dyehouse superintendent at Mohawk Carpet Mills gives "okay" to release batch for production.

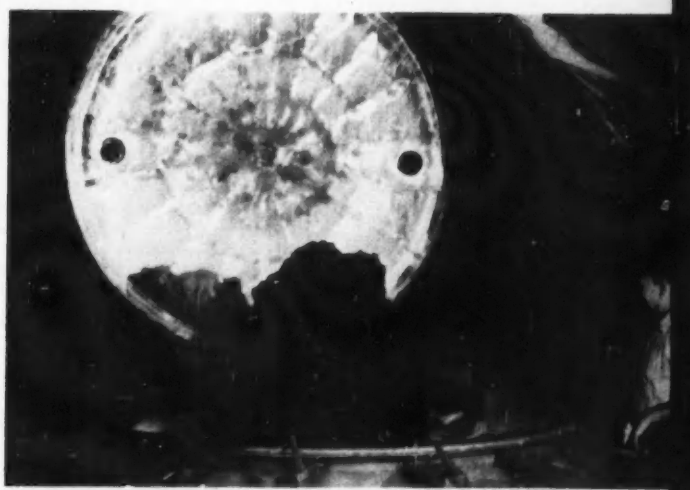
COLOR TOLERANCE is determined and foreman furnishes dye weigher with formula for dye mix. With spectrophotometer, dyeing formulas are easily adjusted.

Mohawk Carpet Quality

ience, the electronic brains of the G-E spectrophotometer and integrator make it possible for us to protect the established quality of Mohawk products. They assure the exacting color matches required in the carpet industry."

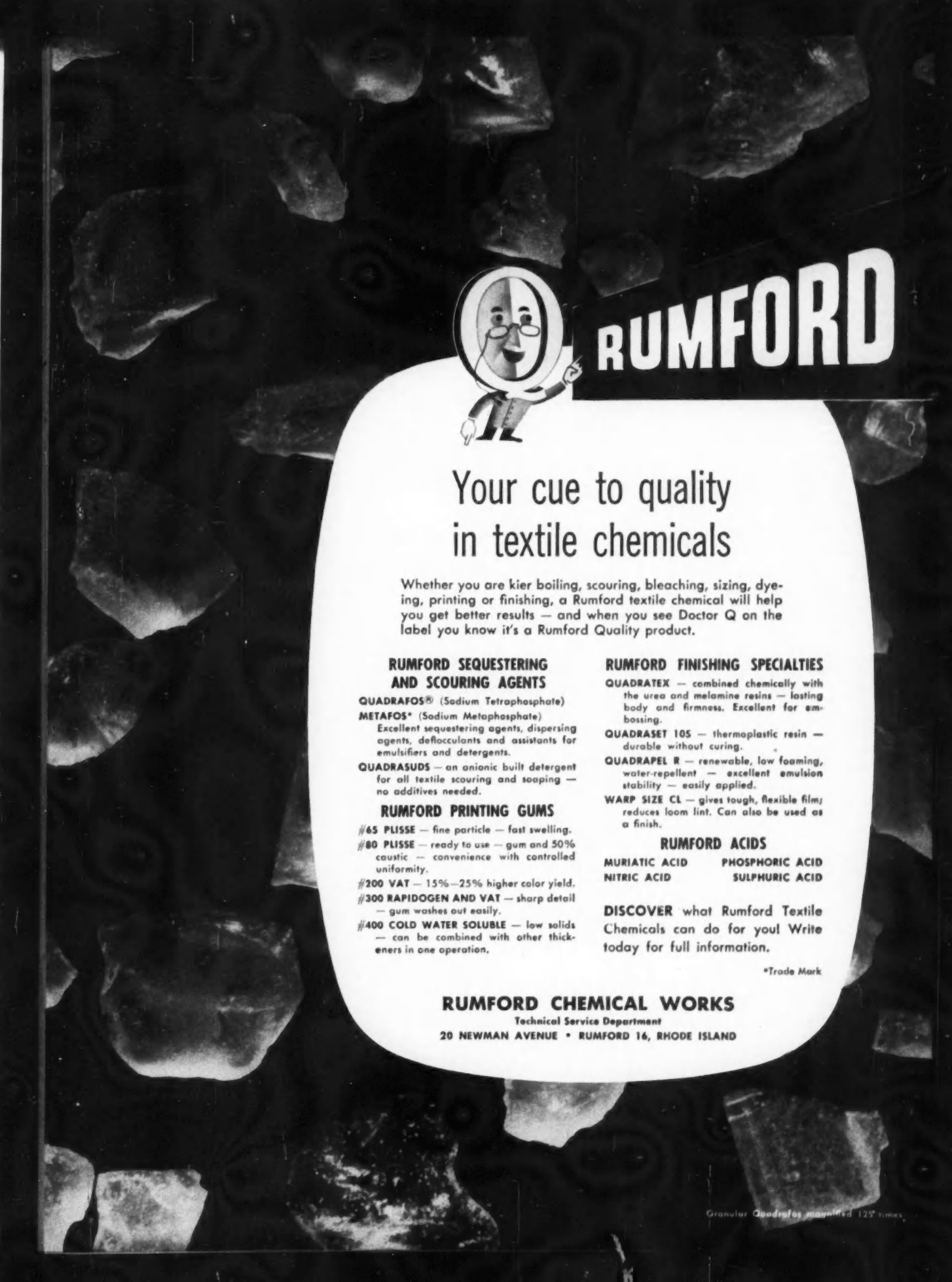
The spectrophotometer furnishes 54-second checks on any test sample. It has cost-cutting applications throughout the wet-processing portion of the fabric industry.

For more information, contact your nearest G-E Apparatus Sales Office, or write for Bulletin GEC-307 to Sect. 605-85, General Electric, Schenectady 5, N. Y.



COLOR CONTROL by G-E photometry helps eliminate mismatching. Here, dye liquor is pumped over raw stock to produce exact color match in Mohawk Carpets.

Now
PAD ACETATE FABR
in the Greige
without detergents, shading or tail-off
PAD COLORS for Acetates and Nylons
These important new PAD COLORS make it possible to pad acetate fabrics in the greige *without* use of detergents or penetrating agents. PAD COLORS eliminate shading and tail-off. Of the water-soluble type, they are ideal for use on acetates and nylons in either pad hot water or pad steam systems. Currently used in production quantities. *Patent Pending*. Colors: BLUE BS, BLUE GS, YELLOW GS, ORANGE 3RS, SCARLET BS, RED RS, RUBINE BBS.
WRITE FOR COMPLETE DETAILS
PAD
DYE CORPORATION
65 CROSBY PLACE PATERSON, N. J.



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Your cue to quality in textile chemicals

Whether you are kier boiling, scouring, bleaching, sizing, dyeing, printing or finishing, a Rumford textile chemical will help you get better results — and when you see Doctor Q on the label you know it's a Rumford Quality product.

RUMFORD SEQUESTERING AND SCOURING AGENTS

QUADRAFOS® (Sodium Tetraphosphate)

METAFOS* (Sodium Metaphosphate)
Excellent sequestering agents, dispersing agents, deflocculants and assistants for emulsifiers and detergents.

QUADRASUDS — an anionic built detergent for all textile scouring and soaping — no additives needed.

RUMFORD PRINTING GUMS

#65 PLISSE — fine particle — fast swelling.

#80 PLISSE — ready to use — gum and 50% caustic — convenience with controlled uniformity.

#200 VAT — 15%—25% higher color yield.

#300 RAPIDOGEN AND VAT — sharp detail — gum washes out easily.

#400 COLD WATER SOLUBLE — low solids — can be combined with other thickeners in one operation.

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QUADRATEX — combined chemically with the urea and melamine resins — lasting body and firmness. Excellent for embossing.

QUADRASET 105 — thermoplastic resin — durable without curing.

QUADRAPEL R — renewable, low foaming, water-repellent — excellent emulsion stability — easily applied.

WARP SIZE CL — gives tough, flexible film; reduces loom lint. Can also be used as a finish.

RUMFORD ACIDS

MURIATIC ACID **PHOSPHORIC ACID**
NITRIC ACID **SULPHURIC ACID**

DISCOVER what Rumford Textile Chemicals can do for you! Write today for full information.

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RUMFORD CHEMICAL WORKS
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Fast shades faster!

CIBALAN BRILLIANT YELLOW 3GL and **CIBALAN BRILLIANT BLUE G** are new colors of special interest. They extend the color range of the group and permit brighter Cibalan dyeings. For the first time, it is now possible to dye bright greens on wool and nylon with the working properties and light and wash fastness afforded by the Cibalans.

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Not 4 . . .

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CIBALAN YELLOW GRL
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CIBALAN CORINTH BL
CIBALAN VIOLET RL
CIBALAN BLUE BL

CIBALAN BLUE BRL
CIBALAN BLUE 3GL
CIBALAN BRILLIANT BLUE G
CIBALAN GREEN GL
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CIBALAN BROWN VRL
CIBALAN KHAKI GL
CIBALAN GREY BL
CIBALAN GREY 2GL

THE "CIBALAN SECTION" of our Technical Division is ready to serve you.

BOONTON, N. J. • CHICAGO 1 • BOSTON 10 • PHILADELPHIA 7 • GREENVILLE, S. C. • GREENSBORO, N. C. • IN CANADA—AJAX, ONTARIO

"...without cost or obligation"

Another textile processing problem solved. He's heading back to Syracuse . . . home and family . . . and maybe a stretch of regular hours in the lab.

Maybe, that is.

A SOLVAY Technical Service man's job can take him any place where there's a customer in need of assistance in handling or using SOLVAY products.

If he's in the Textile Section, he may jump from a rayon plant in the south to a woolen mill in Maine or Minnesota that's having trouble. Yes, days and even nights "in the field" probing problems with the customer's technicians . . . and applying answers that the Textile Section's years of specialized experience and endless research have uncovered.

Seems like quite a job ". . . without cost or obligation". But, SOLVAY has always felt that its responsibility as a manufacturer extends into the plants of its customers—to assure them of peak efficiency from the chemicals that set the standard for the industry.

SOLVAY can supply these not-ordinarily-available services because its Technical Service has separate sections for different industries.

SODA ASH
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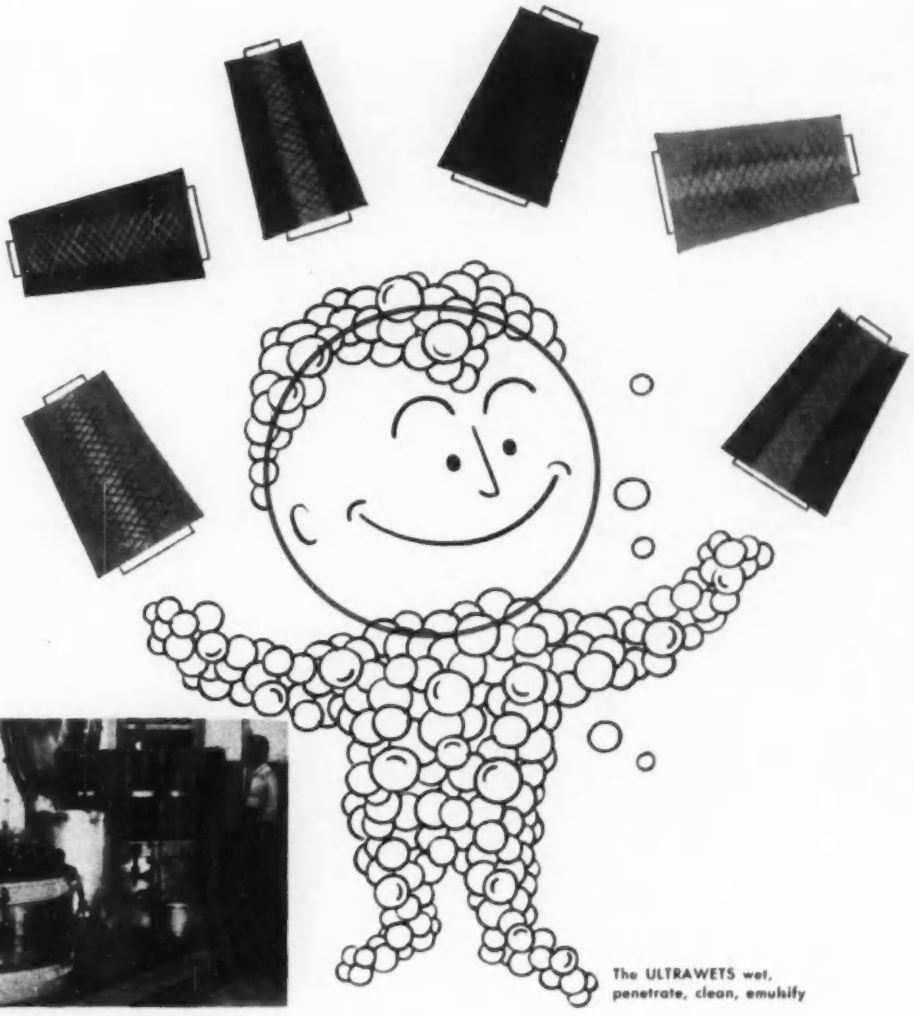

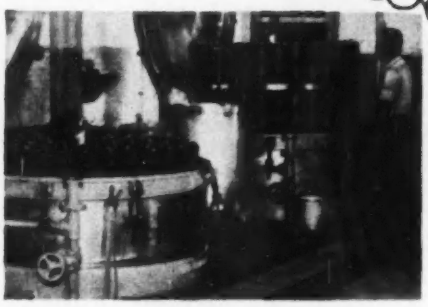

The ULTRAWETS wet, penetrate, clean, emulsify

Smart man to know for **CLEAN, BRIGHT** colors

Here's a man who knows his way around textiles, *Ultrawet 60-L*, a quality alkyl aryl sulfonate, highly skilled at delivering clean, bright colors through your soap-off bath.

Ultrawet 60-L works with economical efficiency. A synthetic detergent, it leaves no soap curd to dull bright colors—heavy metal precipitates cannot be deposited, and even their formation is reduced. Crocking is ended because *Ultrawet 60-L* removes loose dyestuffs with ease.

Like to try *Ultrawet 60-L* yourself? It's easy to use. You'll find it a constantly uniform liquid, with a haze point as low as 14° F. We'll be glad to send you full information on this versatile member of Atlantic's Ultrawet family. Send the coupon, or write one of the offices listed.

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THE ATLANTIC REFINING COMPANY
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Please send me complete details on *Ultrawet 60-L*

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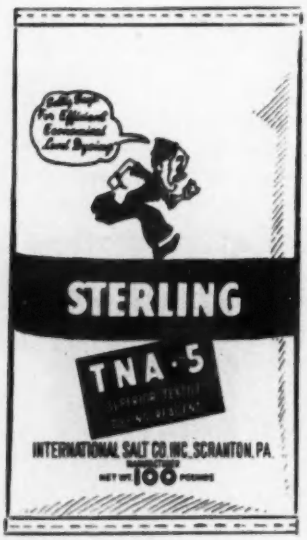
STERLING TNA-5 *superior textile dyeing reagent... clear brilliant colors... softer finish...*

SIX-WAY VERSATILITY
FITS YOUR NEEDS,
LOWERS YOUR COSTS

1 Efficient, economical replacement, pound for pound, for anhydrous sodium sulphate in a neutral dye bath. *2* Neutral, readily soluble in either cold or hot water. *3* Can be used in either the dry fine granular form or automatically converted to fully-saturated brine with the TNA-5 Dissolver. *4* Eliminates dye precipitation, produces a good color yield, level shades and a soft finish. *5* Can be used in a neutral dye bath when dyeing cotton, rayon, wool, or any blend of these fibers—in the staple, yarn or piece goods. *6* Especially effective with Direct or Naphthol dyes, it produces excellent crock fastness and clear, brilliant colors.

For Best Quality Dyeing, Order Your TNA-5 Today!

In 100-lb. bags and bulk



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New

R-300

TEXTILE FINISH

REDUCES

FORMALDEHYDE AFTER-ODOR

TO THE

VANISHING

POINT

YET COSTS NO MORE THAN ORDINARY FINISHES...

GIVES FINEST QUALITY, DURABLE FINISH...

IMPROVED WASHABILITY... IMPROVED HAND...

R-300 Textile Finish – an important new development of Jersey State Chemical Co.– permits the finisher to substantially reduce objectionable formaldehyde after-odor *without increasing his costs.*

Priced in line with ordinary finishes, R-300 actually cuts formaldehyde odor in crisp finishing of nylons to a point where it is negligible – and at the same time reduces unpleasant formaldehyde odor in the finishing room.

None of the benefits associated with highest quality finishes is sacrificed in this improved type. In fact, R-300 gives *better* results in terms of finish, hand, durability and washability.

R-300 is applied in the same fashion as present finishes. Send for complete details today.

MANUFACTURED BY

JERSEY STATE CHEMICAL CO.

89 Lee Avenue Hoboken, New Jersey

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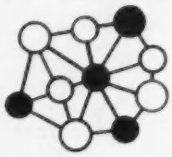
WICASETS AND **WICALOIDS** DEVELOPMENTS OF WICA, OFFER UNLIMITED RANGE OF APPLICATION. **WICASETS** ARE EMULSION POLYMERS AND CO-POLYMERS.



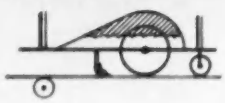
WICALOIDS ARE LATEX

COMPOUNDS. BOTH ANSWER THE PROBLEMS OF THE WET

PROCESSOR OF WOVEN

AND NON-WOVEN FABRICS (SYNTHETIC AND NATURAL) AND WARP YARNS.

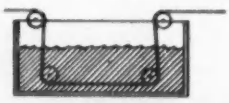
WICASETS AND **WICALOIDS** ARE USED IN ROLLER COATING,



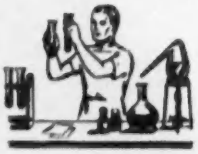
PUDDLE COATING,

SPRAY COATING,

AND IMPREGNATION.



IDEAL IN WORKING WITH FLAT GOODS AND PILE FABRICS. **WICALOIDS** ARE USED ON JUTE, SISAL, AND RAMIE PADS. WICA'S RESEARCH



DEPARTMENT WILL SUPPLY YOU WITH THE ANSWER TO YOUR PROBLEM UPON REQUEST.

Wica

WICA CHEMICALS, INCORPORATED

OLD CONCORD ROAD • CHARLOTTE, NORTH CAROLINA

VERTEX FLAKES • 557 FLAKES
WHITE RIBBON FLAKES • WOOL FLAKES

● With a reputation for producing fine woolens since 1915, The Bell Company of Worcester, Massachusetts, is very particular about the quality of soaps used in their scouring facilities. Yes — Swift's Vertex Flakes, really treat woolens right. Made from the highest grade distilled red oil, Vertex Flakes quickly and gently remove oils and greases picked up in spinning or weaving operations. Because of their low titer (8-12°C), Vertex Flakes dissolve out troublesome contaminants quickly — even at low water temperatures. Swift's Vertex Flakes are highly recommended and widely used wherever fine dyeing calls for complete, yet gentle scouring.

The Bell Company is another of the many leading textile firms that specify Swift's soap for their scouring needs. They know that the name Swift in soap is backed by years of specialized experience and that Swift's soap products are readily available from 375 locations throughout the U. S. and Canada.

Yes, there is a Swift's Soap for your textile needs and a Swift's distributor near you . . . so, the next time you need soap — Call Swift for service and dependability.

ONE TRIAL IS BETTER THAN A THOUSAND CLAIMS

Swift
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TO SERVE INDUSTRY BETTER

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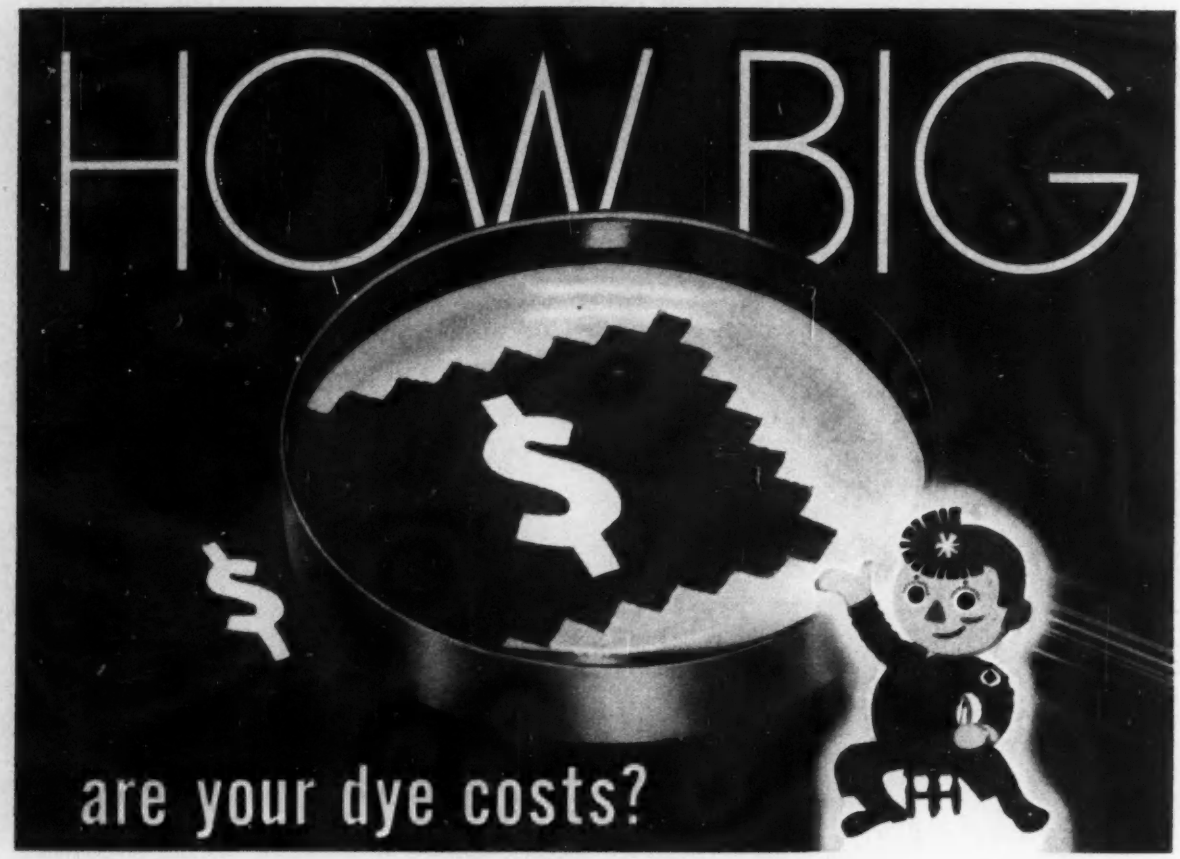

Are excessive production costs bothering you? Then take a look at the savings AMBERTEX can offer.

AMBERTEX is saving printing plants thousands of dollars—by getting far more production out of dyestuffs than more expensive natural gums and other thickeners. Check the savings that AMBERTEX can bring you in screen and roller machine printing with Vat, Rapidogen, Direct, Acetate, and Acid Colors, and White Discharge.

YOU SAVE because less expensive AMBERTEX really gives you the higher color value of starch plus the smoothness and rinsability of natural gums.

YOU SAVE because AMBERTEX really has better running qualities—permits higher speeds without streaks, scratches, or "spits" . . . less "seconds."

YOU SAVE because AMBERTEX really is ready for use. Just blend with chemicals and water. It won't thin out with chemicals or dyestuffs.

YOU SAVE because AMBERTEX really deposits a smooth, pliable film. It minimizes splitting on "Sheers" and other fragile fabrics.

YOU SAVE because AMBERTEX really rinses out quickly and easily once the job is done.

National
STARCH PRODUCTS

Offices: 270 Madison Ave., New York 16; Boston; Providence; Philadelphia; Atlanta; and other principal cities.

ADR

We'd like to know more about these NATIONAL textile specialties.

- ☐ Please send test samples
- ☐ **AMBERTEX**
- ☐ **AMBERFLO**—a gum similar to AMBERTEX but with increased flow. Especially designed for roller machine printing
- ☐ **CLEARFILM**—for clear, lustrous finishes
- ☐ **FLOTEX**—for printing Rapidogen, Indigosol colors and Aniline Black
- ☐ **NU-FILM**—a non-congealing warp size—removable without enzymes
- ☐ **RESYN T**—Polyvinyl Acetate Emulsion manufactured especially for finishing
- ☐ Please have a representative call

Name _____

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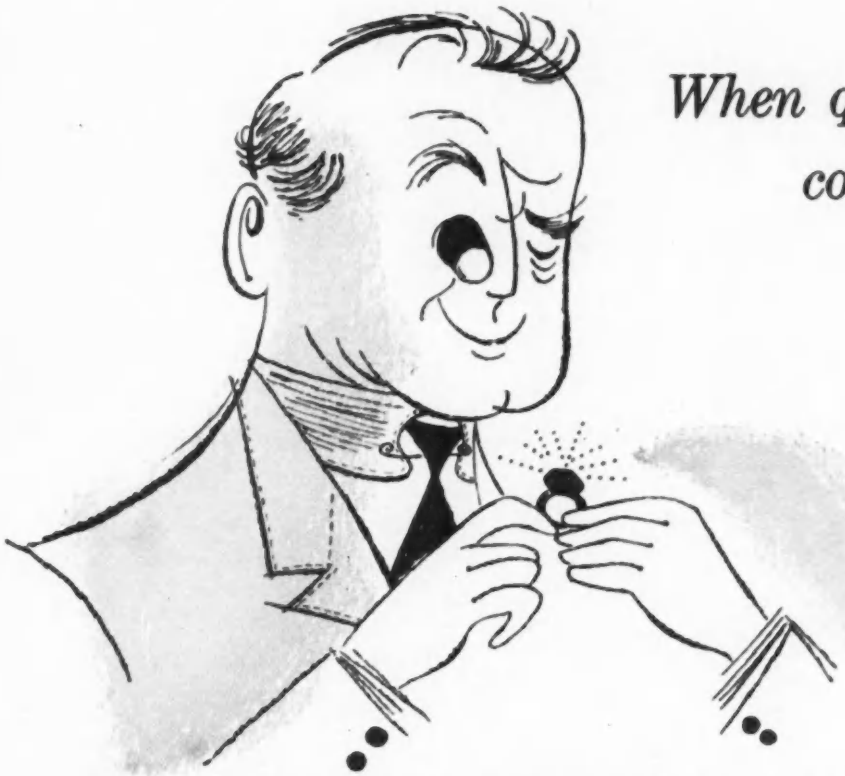

When quality counts . . .

it pays to go to a specialist

WHEN QUALITY DYE PERFORMANCE COUNTS, IT PAYS TO GO TO

ALTHOUSE

Leading Specialists in Dyes for Cotton — Rayon — Nylon and Other Synthetics and **blends**
For 40 years Althouse research has pioneered in raising textile industry standards of

COLORFASTNESS

This record of leadership assures highest quality performance when you specify these famous, exclusive Althouse dye specialties:

Superlitefasts	Nylanthrenes
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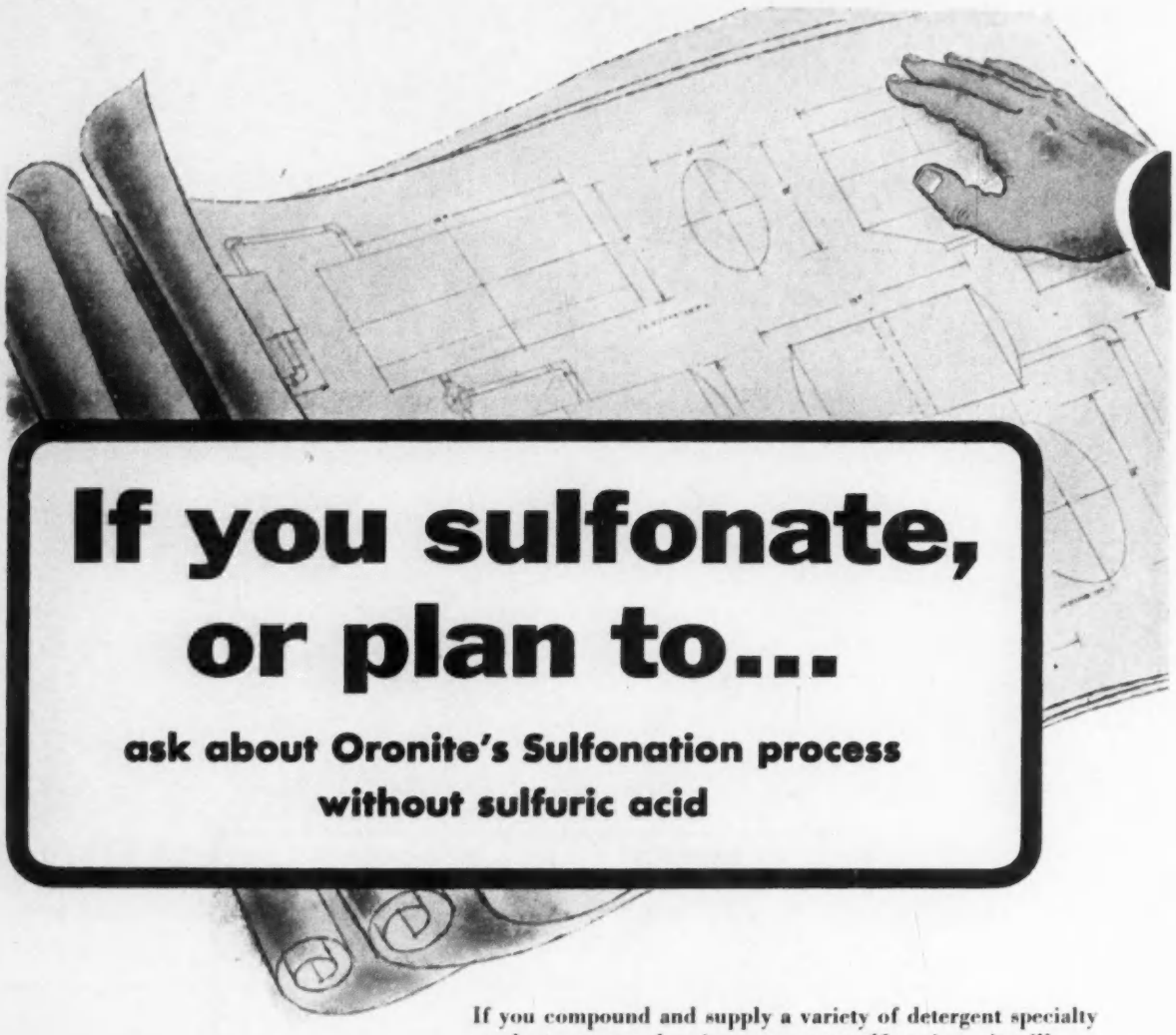

If you sulfonate, or plan to...

ask about Oronite's Sulfonation process without sulfuric acid

Oronite Surface Active Agents

Detergent Alkane
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If you compound and supply a variety of detergent specialty products or are planning your own sulfonation—it will pay you to inquire about Oronite's process design which eliminates the acid disposal problem inherent in so many sulfonation systems. Oronite, the world's largest producer of *basic* detergent raw materials, also has plant designs, to fill any processing requirements from one to 10 million or more pounds of finished products annually.

Contact any Oronite office for engineering, manufacturing data and personal assistance on your individual needs. Our experience costs you nothing.

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"The world's largest producer of synthetic detergent raw materials"

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NON-IONICS—all purpose surfactants

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TERGITOL Non-Ionic XC —low foaming detergent, emulsifier, and dispersant

TERGITOL Non-Ionics NP-14, NP-27, NP-35—emulsifiers and wetting agents

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TERGITOL Anionic P-28 } for dilute solutions of acids, alkalies, and salts

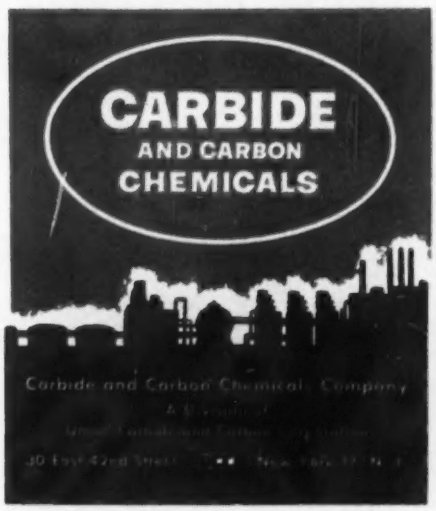
TERGITOL Anionic 4—for moderately concentrated solutions of acids, alkalies, and salts

TERGITOL Anionic 08
TERGITOL Anionic EH } for concentrated solutions of acids, alkalies, and salts

For samples and detailed technical literature call or write the nearest of our 23 offices.

In Canada: Carbide Chemicals Sales Company, Division of Union Carbide Canada Limited, Toronto.

The term "Tergitol" is a registered trade-mark of Union Carbide and Carbon Corporation.



Mix FIRMEL .. for surface beauty
& RESIN DJ . for penetration and permanency

WHEN FINISHING SCHREINERED, EMBOSSED OR FRICTIONED FABRICS

FIRMEL beautifies the surface by producing a high lustre glaze and crisp hand. **RESIN DJ** penetrates the fabric to give fullness and stabilization. It is designed for permanent glaze, stabilized and crush resistant finishes.

COMBINING their surface finishing and penetrating qualities produces a formula for a wide variety of finishes of maximum permanency with a minimum of expense and operational difficulties. Send for samples.

BRYANT CHEMICAL CORPORATION, N. QUINCY 71, MASS. • Box 2301, SPARTANBURG, S. C.

TRITON GR-5

THIS NEW WETTING AGENT

ALSO GIVES YOU HIGHLY

EFFECTIVE REWETTING

EVEN AFTER PROLONGED

FABRIC STORAGE

TRITON GR-5 is not only soluble in water in all proportions but is stable—particularly to lime and magnesium salts—and electrolytes. And TRITON GR-5 is economical, too. But that's only half the story.

TRITON GR-5 is an excellent *rewetting* agent. It wets back after it has dried into the fabric, permitting high absorption under normally difficult conditions, and maintaining fabric absorbency through prolonged storage.

What's more, TRITON GR-5 puts a real sales feature into towelings. They are extra absorbent *when new*—don't need usual pre-use washings housewives complain about.

CONSIDER THE SPECIAL FEATURES OF THIS ECONOMICAL NEW WETTING-REWETTING AGENT; THEN CALL YOUR NEAREST ROHM & HAAS OFFICE.

CHEMICALS FOR INDUSTRY

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Representatives in principal foreign countries

TRITON *is a trade-mark, Reg. U.S. Pat. Off. and in principal foreign countries.*

DYEING AND FINISHING COSTS CUT WITH "DUPONOL"* RA— DU PONT'S MORE EFFICIENT SCOURING AGENT!

You need less to do the job with Du Pont "DUPONOL" RA—because it's more potent in removing solid soils, waxes and oils. In most cases, maximum detergency is achieved at concentrations of .15% or lower!

You can do more jobs with Du Pont "DUPONOL" RA. Several mills using "DUPONOL" RA surface active agent have found it effective for *all* wetting and detergent uses. This simplifies inventory, purchasing, handling and formulating problems.

Your dyeing job is easier with Du Pont "DUPONOL" RA—because it gives top scouring performance in preparing fabrics for dyeing. And because of the high detergency, wetting and penetration properties found in "DUPONOL" RA, even fabrics constructed of yarns with high twist are penetrated in the dyeing operations following scouring. Often, less softener is required following boil-off with "DUPONOL" RA.

What's more, you get controlled foaming! "DUPONOL" RA provides sufficient foam to suspend solid soils, waxes and oils, without causing excessive foam build-up.

For complete information, write to E. I. du Pont de Nemours & Co. (Inc.), Dyes and Chemicals Division, Wilmington 98, Delaware.

DU PONT

DUPONOL® *RA...*

liquid detergent

* REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

DU PONT

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Acetate needs the color protection of
EASTMAN GLF DYES

Para SHOWER CURTAINS
have that protection

"Sophisticated Kitty" is the name of a new line of acetate shower curtains offered by Para Manufacturing Company.

The name is apt in more ways than one, for these curtains seem to have nine lives. The durability of their color—*and color is the determining factor in the useful life of any cloth shower curtain*—is amazing.

Secret of their enduring color is Para's insistence on use of Eastman GLF dyes. Para knows that GLF dyes give piece-dyed acetate outstanding gas and light fastness . . . a light fastness comparable to that of many vat-dyed cottons . . . a gas fastness exceeding even drapery trade requirements.

Consistent advertising is building a new reputation for piece-dyed acetate—one that accents long color life. Take advantage of this trade promotion. Let your customers and prospects know that you are equipped to deliver the high degree of color fastness possible with Eastman GLF dyes.

Eastman's technical staff will supply GLF formulas to match any color sample and is ready to substantiate your dyeing results with any testing services you may need.

Eastman Acetate Dyes are sold in the United States by Eastman Chemical Products, Inc., a subsidiary of Eastman Kodak Company, in Kingsport, Tenn., Lodi, N. J., and Greenville, S. C. On the West Coast through Wilson Meyer Co.: San Francisco, Los Angeles, Portland, Seattle and Salt Lake City. In Canada, through Clough Dyestuff Company, Ltd., St. Laurent, Quebec.

—the finest acetate fibers and dyes are made by **Eastman**

From wool to the new synthetics—

When you use soap

Colgate Formula 10 does the best job!

Gives a better final result. 92% Sodium Oleate . . . titer on the fatty acids 10° Centigrade . . . easily dissolved . . . excellent detergent effect . . . mild fulling action when you want it. Easily rinsed at low temperatures with no bad odor left in the fabric.

Yes, you can depend on COLGATE FORMULA 10* for dozens of textile processing and finishing jobs.

For low-temperature washing *ordinarily requiring olive oil soaps*, try COLGATE FORMULA 25*.

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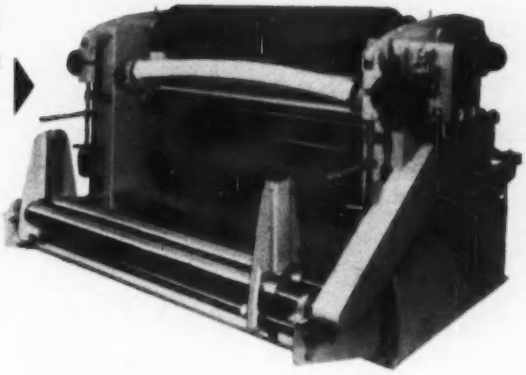

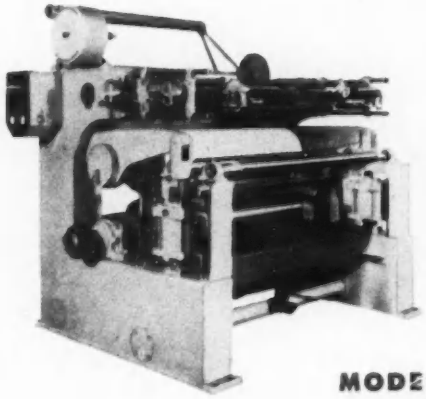

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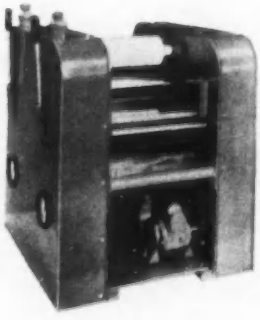

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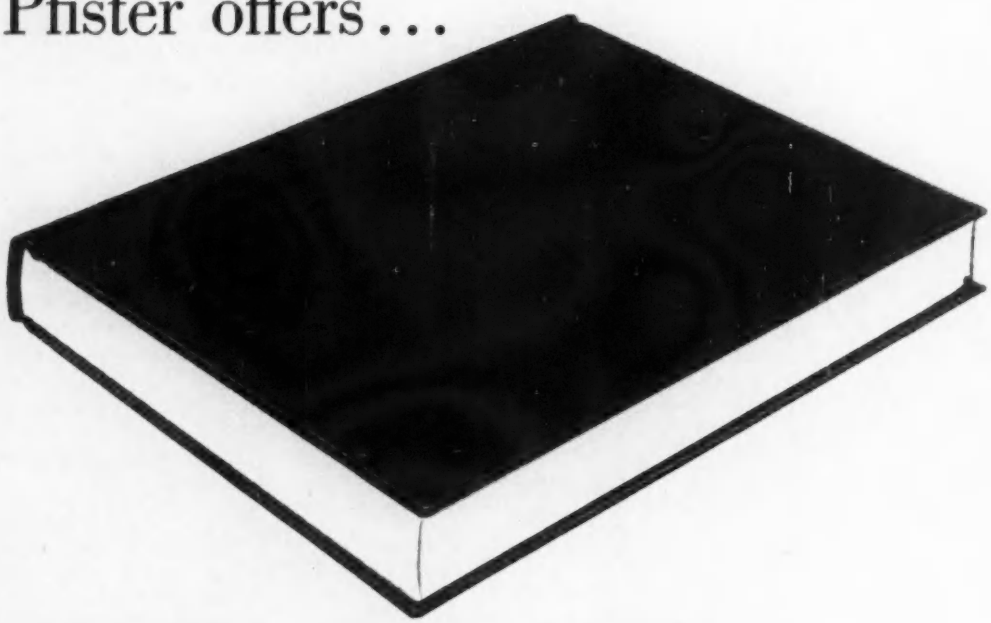

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AATCC Administrative Newsletter #1

NEWS FROM THE TOP

Among the first official moves by Ray Jacoby, AATCC's new president, was the "reactivation" of the President's Advisory Committee as a continuously functioning group, which would seriously consider and discuss various matters before they are submitted to the Council. The Committee, which is purely advisory in nature, held its first meeting on January 20th with past president Bob Bonnar presiding, and came up with recommendations to the Council for studies of additional duties for the four regional vice presidents, continuation and expansion of a Student Interregional Contest, reimbursements for expenses incurred by local sections in the preparation and publicizing of meetings, and the Association's potential role in promoting a "Career in the Textile Industry" for the young men and women of our nation.

The following presidential appointments for 1955 committee chairmanships were approved by Council on January 21st. Executive Committee on Research – L S Little; Technical Committee on Research – C W Dorn; Publicity – J A Doyle; Appropriations – A E Sampson; Membership and Local Sections – G L Baxter; Publications – P Theel; Corporate Membership – A E Johnson; Constitution and Bylaws – H C Chapin; Technical Supplies – H C Chapin; Conventions – C O Linberg; Technical Program – A W Etchells; Colour Index Editing – W H Cady; and Colour Index Marketing – A E Sampson.

Council has also approved the appointment of Edmund A Leonard as vice chairman of the Perkin Centennial.

FROM THE COUNCIL CHAMBER

New councilors answering the roll call for the 195th meeting of AATCC's "legislative" body on January 21st included the following: Ernie Kaswell (NNE), Edward Gamble (RI), Rudy Geering (WNE), Irwin Smith (H-M), Bill Brommelsiek and Jack Hennessey (NY), Richard Shimp and Arthur Etchells (Phila), Henry Rutherford (Pied), Bill Griffin (SE), Lawrence Heffner (Wash), Eric Camp and L B MacFarland (Mid-West), Hubert Des Marais (PNW), and Sidney Springer (PSW).

George Baxter, chairman of the Committee on Membership and Local Sections, reports that applications for membership continue to roll in with our foreign friends showing ever-increasing interest in the Association's activities. The latest group of applicants approved by Council includes 63 senior, 16 associate, 7 junior, 18 student, and 3 corporate in addition to 19 applications for transfer to senior membership.

Al Johnson, chairman of the Corporate Membership Committee, reports that the Committee will shoot for a goal of approximately $61,000 this year, using a dual approach of mail and personal solicitation. The Council has approved a new suggested dues schedule for corporate membership which is designed to outline a fair and proportionate dues payment based upon the relative benefits which Corporate Members derive from the Association and its research program.

AATCC Treasurer Al Sampson, who also wears well the title of Appropriations Committee chairman, reports that the Association continues on its solvent way, and that the Colour Index is "on schedule."

Jim Doyle, succeeding Glenn Jackson as chairman of publicity, has set in motion a program for expanded coverage of AATCC affairs. Jim has set up a committee which includes the publicity chairman from each local section as well as others who are in a position to funnel information on AATCC doings to his committee. Tom Scanlan, Philadelphia Section publicity chairman and chairman of publicity for the 1955 Convention in Atlantic City, has accepted the post of vice chairman of national publicity.

George Linberg, chairman of the Convention Committee, has announced that Dick Frey will serve as secretary of the Committee. Dick's previous experience makes him well qualified for this assignment. Among his duties will be the sale of exhibit space at the national conventions.

The Council has okayed Chicago as the site for the '58 Convention under the auspices of the Western region, and the possibility of having Washington, D C as the Convention city in '59 was introduced.

The next meeting of the Council is set for April 29th at the Hotel Dennis, Atlantic City, N J, during the week of the 42nd Knitting Arts Exhibition in that city.

AATCC CALENDAR

(a general calendar of events may be found on page 128)

COUNCIL
Apr 29 (Hotel Dennis, Atlantic City, N J); June 17; Sept 21 (Chalfonte-Haddon Hall, Atlantic City, N J); Nov 18; Jan 20, 1956; Apr 20, 1956; June 15, 1956.

NATIONAL CONVENTIONS
Sept 22-25, 1955 (Chalfonte-Haddon Hall, Atlantic City, N J; 1956 (Waldorf-Astoria, New York); 1957 (Boston); 1958 (Chicago); 1959 (Washington, DC—tentative).

HUDSON-MOHAWK SECTION
Feb 25, Apr 15 (Jack's Restaurant, Albany, N Y); May 20 (Ladies Night); June 24 (Annual Outing).

MID-WEST SECTION
Apr 16 (Netherlands Plaza, Cincinnati, O); June 11 (Lake Lawn Lodge, Delavan, Wis).

NIAGARA FRONTIER SECTION
Mar 4 (Hamilton, Ont); April 22 (Buffalo); June 24 (Outing).

NEW YORK SECTION
February 25 (Skytop, Hotel Statler, New York); March 18, April 22, May 20 (Kohler's Swiss Chalet, Rochelle Park, N J).

NORTHERN NEW ENGLAND SECTION
Apr 22; June 10 (Annual Outing); Oct 14; Dec 9.

PHILADELPHIA SECTION
Mar 4 (Penn-Sherwood Hotel, Philadelphia); Apr 15 (Kugler's Restaurant, Philadelphia); May 20 (Outing———Manufacturer's Golf & Country Club, Oreland, Pa); Oct 21 (Penn-Sherwood Hotel); Dec 2, Jan 13 (Kugler's Restaurant).

PIEDMONT SECTION
Apr 30 (Robert E Lee Hotel, Winston-Salem, N C); June 10-11 (Mayview Manor, Blowing Rock, N C); Oct 29 (Hotel Wm R Barringer, Charlotte, N C).

SOUTH CENTRAL SECTION
Feb 26, May 14 (Hotel Patten, Chattanooga, Tenn); July 29-30 (Lookout Mtn Hotel, Chattanooga, Tenn—pending); Dec 10 (Hotel Patten, Chattanooga, Tenn).

SOUTHEASTERN SECTION
Apr 23 (American Legion Club, Lindale, Ga); June 3-4 (Annual Outing, Radium Springs, Ga); Sept 10 (Ralston Hotel, Columbus, Ga); Dec 3 (Atlanta Biltmore, Atlanta, Ga).

WASHINGTON SECTION
May 20.

WESTERN NEW ENGLAND SECTION
Mar 18 (Rapp's Restaurant, Shelton, Conn); May 13 (Ladies Night); June 17 (Annual Outing); Sept 16 (Rapp's); Nov 4 (Hartford, Conn); Dec 16 (Rapp's).

ACTIVITIES OF THE LOCAL SECTIONS

Officials at the Philadelphia Section's January 14th meeting—(Seated, l to r): Richard A Shimp, E I du Pont de Nemours & Co, Inc, councilor; Thomas H Hart, The Hart Products Corp, vice chairman; Raymond W Jacoby, Ciba Co, Inc, AATCC president; Frederick V Traut, Globe Dye Works Co, chairman; Edward S Diehl, Ankokas Dyeing & Processing Co, councilor; Arthur W Etchells, Hellwig Dyeing Corp, councilor. (Standing, l to r): Carleton T Anderson, Ciba Co, Inc, councilor; Donald W Robinson, Para-Chem, Inc, sectional committeeman; Francis E Nevins, Ciba Co, Inc, sectional committeeman; Matthew A Noonan, Becco Chemical Div, Food Machinery & Chemical Corp, sectional committeeman; and Thomas R Scanlan, Jr, The Hart Products Corp, publicity chairman.

PHILADELPHIA———The Philadelphia Section met January 14, 1954 at Kugler's Restaurant, Philadelphia, Pa, with approximately 100 members and guests on hand to hear R J Thomas, E I du Pont de Nemours & Co, Inc, present the Section's 1954 Intersectional Contest Paper—"Factors Affecting Tint Removal from Staple Fibers". Du Pont's Paul Speakman, chairman of the '54 Intersectional Contest Committee, presented to A Ward France, dean of faculty at Philadelphia Textile Institute, a bound copy of the paper to be added to the PTI library.

Among those attending the meeting were AATCC president Raymond W Jacoby and James A Doyle, newly appointed chairman of the National Publicity Committee.

The next meeting of the Philadelphia Section will be held March 4 at the Penn-Sherwood Hotel in Philadelphia.

* * * * * * *

RHODE ISLAND———Approximately 125 members and guests were attracted to the Rhode Island Section meeting of January 27, 1955, to hear Albert C Neussle, head of the Textile Applications Laboratory, Rohm & Haas Co, Philadelphia, speak on "Some Controversial Aspects of Crease Resistance of Cellulosic Fabrics".

Other highlights of the business and technical session, which was held at the quarters of the Providence Engineering Society, Providence, R I, included an address by AATCC President Raymond W Jacoby, and a report by Thorwald Larson on the 195th Council meeting.

65 members participated in a pre-meeting social hour and dinner at the Crown Hotel.

STUDENT CHAPTER—GEORGIA INSTITUTE OF TECHNOLOGY

Seated (l to r): **J J Wilson, secretary; J Lancaster, chairman; D H Holmes, vice chairman; J KeeChi, treasurer.**

Standing (l to r): **R E Winn, E M Arsuaga, J Nelms, D A Haddock, D M Hankins, E H Hinton, W H Carlson, C K Cobb, W Abrams.**

Not pictured: B M Phillips, R Ranieri, W N West, G R Norwood, R V Clark.

33rd Annual Convention
Preparing and Dyeing of Textiles——

SOURCE OF UNBLEACHABLE COLOR IN COTTON*

S A SIMON and C HARMON
Research Division, Chicopee Falls Manufacturing Corp
Chicopee Falls, Mass

Sources of color in cotton are classified as dirt, geometric, intrinsic and extrinsic. Dirt refers to those sources readily removed by mechanical cleaning methods. By geometry is covered the physical factors of shape. Intrinsic color refers to genetic color dependent upon variety of the seed; while extrinsic color is that brought about by exposure to the environment and is not mechanically cleanable.

It is shown that only extrinsic color interferes with bleaching. By means of color evaluation with a spectrophotometer, evidence is provided which shows that the so-called unbleachable colorant is developed by fungi.

INTRODUCTION

BLEACHING is generally held to be a simple uncomplicated process. However, it is equally true that, once the bleacher finds himself confronted with a bleaching problem outside the routine practice, built up over the years of trial and error, he is at a loss to proceed. Unless the bleacher's cook book provides the recipe, he has no philosophy to guide him except to add more bleach. Now, bleaching is a system, a process, defined by at least three elements: the textile (cotton), the bleaching agent, and the reaction medium (water). Most of us, by selecting our cottons and by adjusting the water to a constant quality, are able to develop a bleach formula which works very well day in and day out. It is well to emphasize here that the key to this simplification of the bleaching system is in the selection of the cotton and in holding all conditions constant. Only those cottons found by experience to bleach readily are selected for bleaching.

It is the experience of the industry that there are color grades of cotton with a resistance to bleaching and dyeing that is detrimental to the end quality of the manufactured product. The difficulty in bleaching and dyeing cotton increases with the lowering of the color grade. Since in many mills the regularity of color is important, the use of colored cotton below that which is normal for the mill's minimum grade would cause streaks in finished fabrics. Hence, many mills set their low-limit-grade purchases on this basis. To such mills, low-grade color would cause difficulty even if they used bales that contain leaf equal to or above that of good middling. Gray cotton, for example, is not liked by such a mill.

When cotton is subjected to a bleaching process it behaves in one of three ways, as illustrated in the graph of Figure 1.

In Type I we find a behavior characteristic of the better-quality cottons wherein initial whiteness in the raw is already high; the reflectance is generally lessened as the result of kier boiling. This would appear to be a result of the absorption of products from the kier liquor. After bleaching, maximum whiteness is readily attained.

In Type II, a dull cotton, initial color is lower; and kier boiling hardly makes a difference. Bleaching, while elevating the whiteness level, nevertheless falls short of Type I.

In Type III, a so-called gray cotton, color is initially very poor, so that it is generally benefited by a kier boil. Even after bleaching, however, the reflectance attained is barely as good as the raw color of Type I cotton.

Why do these fibers differ so greatly in their behavior during purification and bleaching? What is the nature and source of the coloring matter which accounts

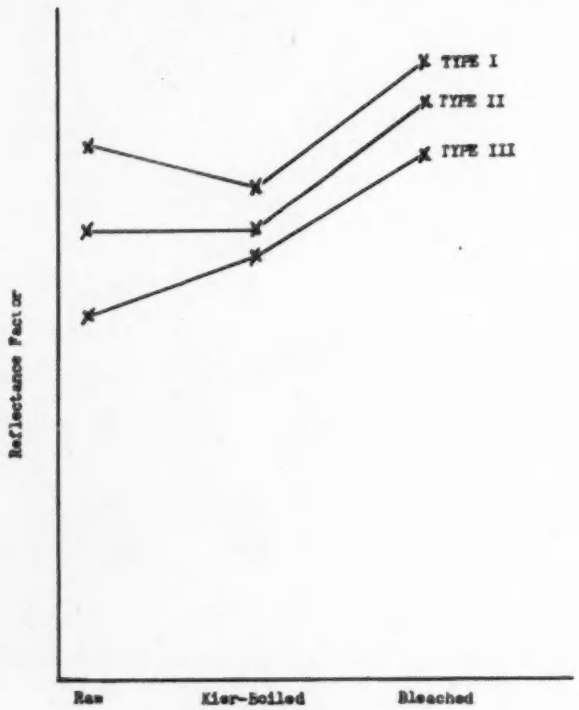

Figure 1
Color Classification by Process

* Presented by S A Simon in the Ballroom of the Atlanta Biltmore Hotel in Atlanta, Ga, on Wednesday afternoon, Sept 15, 1954 with Walter M Scott presiding.

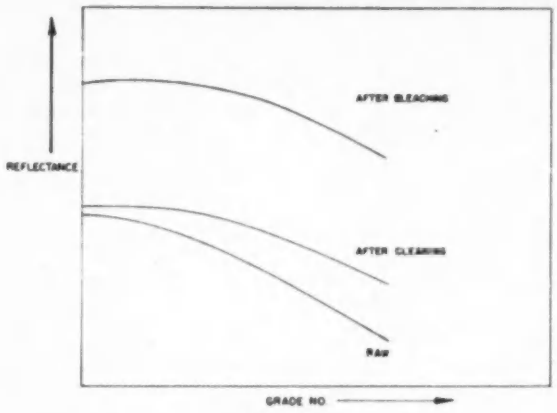

Figure 2
Effect of cleaning on the reflectance of cotton

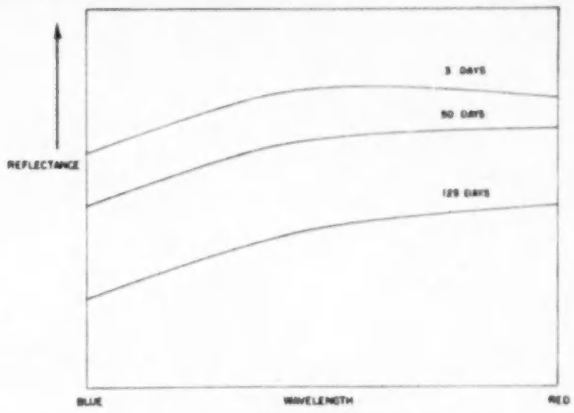

Figure 3
Effect of field exposure. Reflectance curves for cotton picked at intervals following opening. Before bleaching

for these differences in bleachability? In this discussion we will concern ourselves with this color phase of the bleaching system.

SOURCES OF COLOR

There are four sources of color in raw cotton: dirt, fiber geometry, intrinsic color, and extrinsic color.

Dirt includes trash, foreign matter, and other impurities which are mechanically removable.

Fiber geometry, as a source of color, relates to such physical effects as curl, twist, cross-sectional shape, etc.

Intrinsic color is the inherent, genetic color of the cotton and is probably determined by the variety of the seed before the seed is planted.

Extrinsic color is the color which is developed in the cotton by its environment or other external agencies. It differs from dirt in that it is not removed mechanically.

DIRT——*Dirt* is defined as dust, soil, or trash residues, which may be removed by mechanical means. The change in reflectance due to the removal of dirt is, in general, not great, but is greater for the lower grades than for the higher grades.

After bleaching, both the raw uncleaned and cleaned cottons fall on the same curve. The presence or absence of the dirt has no effect on bleachability in the sense that the bleach system may be adjusted in compensation. Dirt on the raw cotton may be a nuisance, but it is not the cause of the grayness which persists after bleaching. Figure 2 illustrates the effect of cleaning on the reflectance of cotton before and after cleaning. After bleaching, the curves appear identical.

GEOMETRY——Reflectance readings may be affected by fiber geometry: for example, curl, packing or density, orientation, etc. Solutions and films cast from the cottons illustrated in Figure 1 indicate that geometry is not the source of unbleachable dull and gray color. For this reason, fiber geometry is discounted as a factor of concern in this discussion.

INTRINSIC COLOR OF COTTON ——The first recorded mention of the problem of color in cotton may have been made by Penot in 1836. Variations in bleachability were attributed rather to bleaching conditions than to variations in the cotton.

The first investigation of the nature of the pigments in cotton fiber seems to have been that of Schunck in 1868. Schunck believed the coloring matter of cotton fiber to be an amorphous mixture of two nitrogen-containing components, one soluble and the other insoluble in alcohol.

Shortly after this, two different theories about the chemical composition of the coloration in cotton began to take form. The first of these by Hess in 1928 maintains that the flavones, orange-yellow pigments, are responsible. Flavones usually occur in the form of glucosides, and hence we have Wittmack's suggestion that

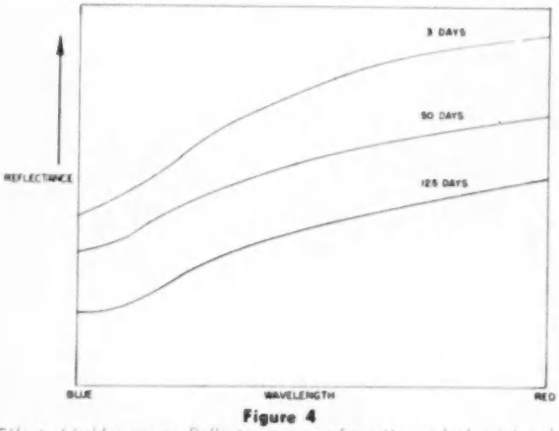

Figure 4
Effect of field exposure. Reflectance curves for cotton picked at intervals following opening. After bleaching

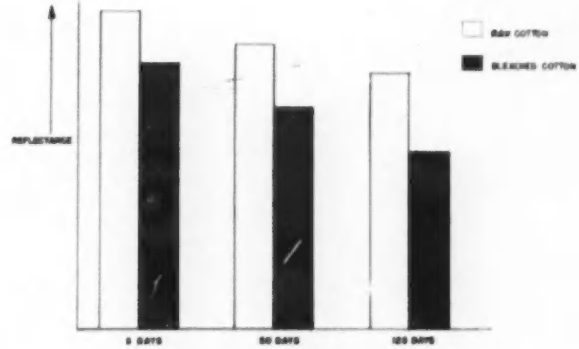

Figure 5
Effect of exposure on reflectance

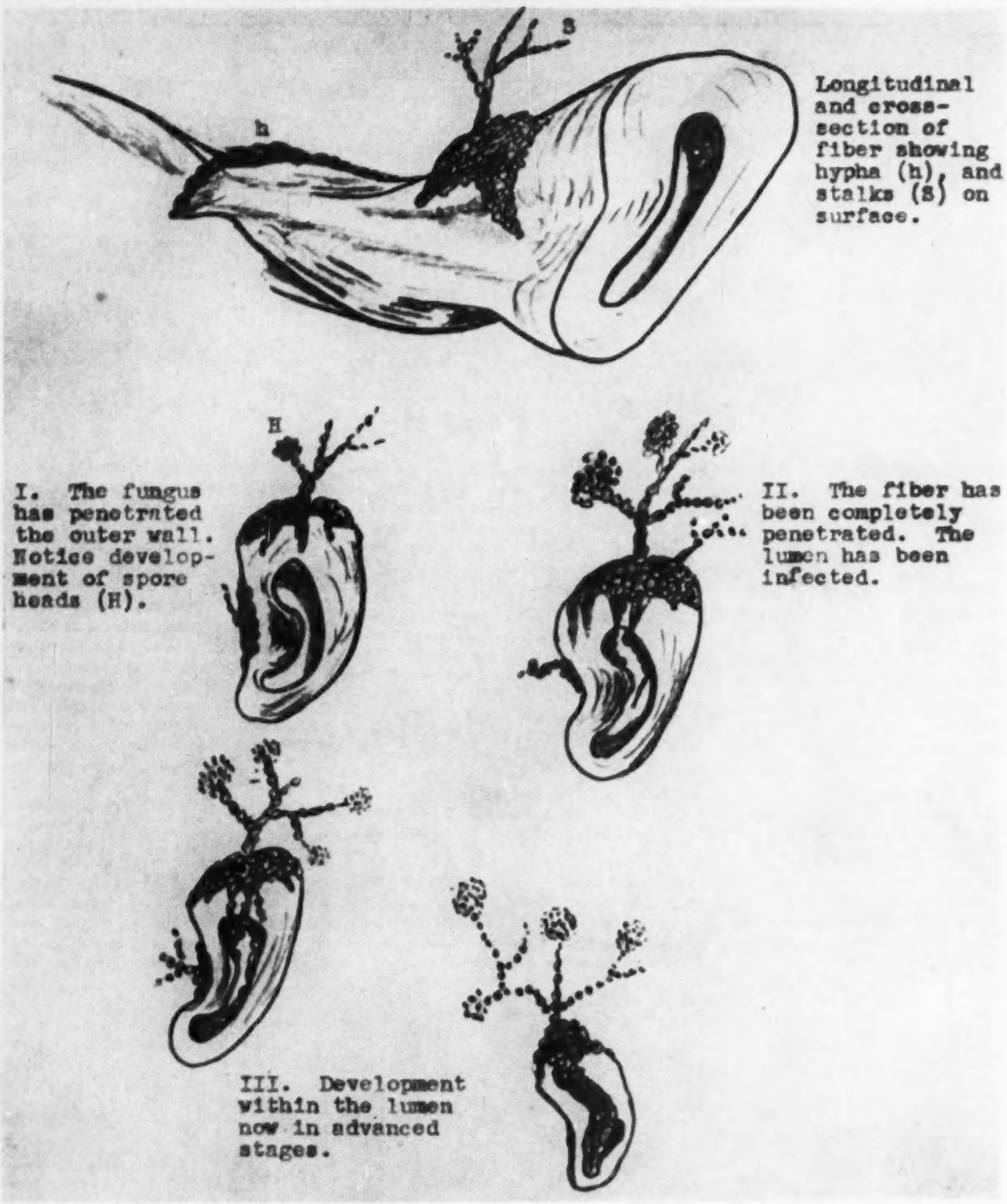
S
h
Longitudinal and cross-section of fiber showing hypha (h), and stalks (S) on surface.
H
I. The fungus has penetrated the outer wall. Notice development of spore heads (H).
II. The fiber has been completely penetrated. The lumen has been infected.
III. Development within the lumen now in advanced stages.

Figure 6
Idealized sketch of Cladosporium in various stages of development on cotton

the flavone derivative in cotton is the glucoside.

According to the second theory, advanced in 1930 by Oparin and Rogowin, the coloring matter is chlorogenic acid, a compound which had been isolated earlier from the coffee bean. Let us examine this theory first.

Chlorogenic acid is, at most, a precursor of a pigment and not a pigment itself. Repeated attempts in our laboratory to isolate any of the residual coloring matters from Types II and III bleached cottons have forced the conclusion that these intrinsic colorants are absent. As

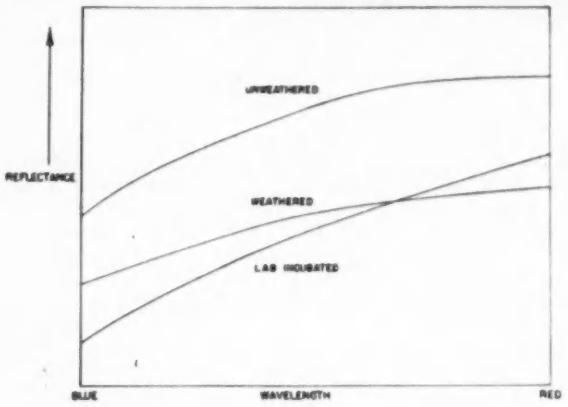

Figure 7
Color analysis of some raw cottons

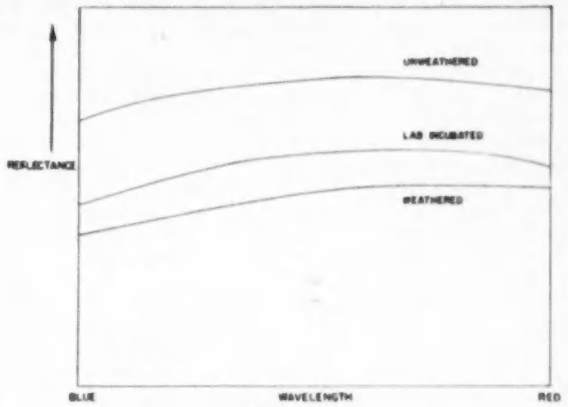

Figure 8
Color analysis of some bleached cottons

a result of detailed chemical consideration of the structure of this compound, we are led to the conclusion that the coloring matter of raw cotton is more likely a flavone.

Now, what about flavones? Flavones are removable from raw cotton by commercial bleaching procedures and are not found in the bleached cotton. Hence, some other agency other than intrinsic color is the source of the grayness remaining after bleaching. In other words, the color of dull or gray cotton, which persists after bleaching, is not of a genetic, or intrinsic, origin.

EXTRINSIC COLOR

For most of our information on extrinsic color we have had to observe the action of weather on cotton. This weathering of cotton in the field has received much attention in the literature. In particular, Nickerson and Marsh discussed the field exposure which results in the graying of cotton fiber and in lower grades.

From a selected field, cotton samples were picked 3, 50, and 125 days, respectively, after opening and were color-analyzed in the spectrophotometer both before and after bleaching. Curves typical of the phenomena we are discussing were obtained. The reflectance diagrams for these samples are given in Figures 3 and 4.

It will be observed that the curves for all samples are esentially similar, differing only in their vertical displacement. The curves for the raw cottons exhibit selectivity as well as achromaticity. After bleaching, selectivity had been largely removed and achromaticity is now the dominant property remaining.

These data are rearranged in Figure 5 to show the effect of weathering conditions on reflectance at a median wave length. It can be seen that increasing the exposure time reduces the reflectance of both the raw and bleached samples similarly.

Marsh suggested that three organisms are generally present whenever these weathered, dark-colored cottons are examined: Alternaria, Cladosporium, and Fusarium moniliforme. The Alternaria are blackish, the Cladosporium are dark brown, and the Fusarium moniliforme are near white.

Siu believes that fungi first attach themselves to the surface of the cotton fibers, penetrate the fiber walls, and finally infect the lumen of the fiber, as illustrated in the idealized sketches in Figure 6. On the basis of this explanation, the extent of this penetration might be expected to be a function of the severity of the weathering conditions, and this severity, in turn, would control the extent of discoloration in cotton.

A sample of unweathered white cotton and samples of the same cotton after 12 weeks of weathering were obtained from Dr Marsh. The weathered cotton was examined and found to contain fungi, largely Alternaria, Cladosporium, and Fusarium, while the unweathered sample was relativevly free from fungi. A portion of the unweathered cotton was then impregnated with a water extract of some of the weathered cotton and subse-

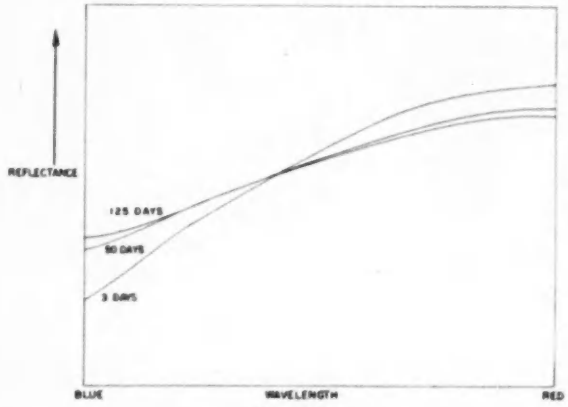

Figure 9
Analytical curves of Figure 3 (raw cottons) superimposed

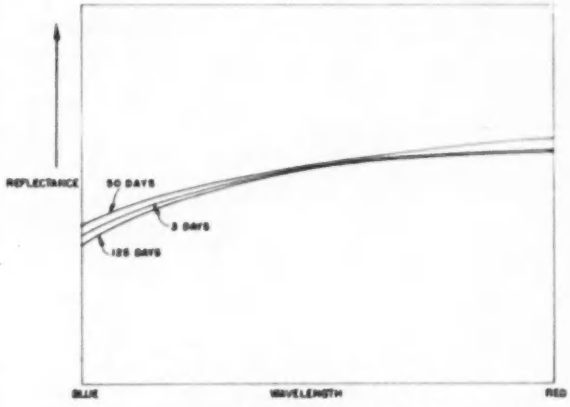

Figure 10
Analytical curves of Figure 4 (bleached cottons) superimposed

quently incubated for 2 weeks. The color analysis before and after bleaching of the weathered, unweathered, and unweathered but incubated cottons are shown in Figure 7 for the raw samples and in Figure 8 for the bleached samples.

We recognize that the samples tested in this exposure series might have differences in intrinsic color as well as extrinsic color. These differences would appear in the form of hue variations, especially with respect to the yellow side of the color spectrum. Because of the easy bleachability of the flavones, any hue differences existing in this raw cotton should be eliminated in the bleached cotton—unless, of course, the flavones had been rendered fast as a result of combinations or degenerations developed during the course of exposure and time. This is unlikely, however.

By superimposing the analytical curves of the exposed cottons, raw and bleached, at their respective mid-points, it is shown that hue is not the factor of difference. This confirms what has been said of the flavones. The intrinsic color completely disappears upon bleaching.

This is shown in Figures 9 and 10.

It can be noted that in Figure 7 the curves of the exposed raw cottons are skewed or selective with respect to the white raw cotton, but in Figure 8 the curves for all the bleached samples are substantially congruous. This indicates that the hue factor is substantially eliminated by bleaching and confirms the bleachability of the intrinsic color. Furthermore, the condition of achromaticity is again established and must be due to the presence of the microorganisms or their residues.

SUMMARY

Bleaching is a process, a system, whose components must be considered all together in order to understand any one part or phase properly. Of the three components of the bleach system—agent, medium and fiber — it is the fiber which has been studied the least from the point of view of participation in the process. Cotton fibers are classified as to color and bleachability. The nature and source of color in cotton is discussed. It is shown that the color which persists through conventional bleaching is due to fungi.

DISCUSSION

Question: I think you said that the yellow hue in cotton is due to its intrinsic color. Is there any possibility that this color can redevelop through oxidation or reduction or through some effect of aging, such as we notice in the yellowing of fibers after they are in use for a number of years?

Answer: We have noted that raw cotton continues to bloom, that is, to increase in yellow color, for twenty years.

We have heard that cotton will turn yellow after bleaching. The exact nature of this process I do not know. I have seen samples of cotton, however, that do not change color after bleaching. I imagine that the source of the yellowness where we have seen it develop in bleached cotton — I am speculating now — is probably due to wax.

Q: You spoke about the graying of cotton. Did you ascribe this, primarily to microbiological action?

A: I believe it is entirely due to that cause, and I have tried to show you that.

Q: You said, I believe, that fiber geometry affects whiteness but has no relation to bleaching. Can you explain that?

A: Well let's put it this way, an 80 square looks whiter to the eye than a 20 x 12. Packing has a great influence on reflectance. In our work we were looking to find if that effect was the same for bleached and unbleached cottons. There was a slight difference, but it was not of a magnitude that causes grayness. It can therefore be discounted as of minor importance and not the source of the problem.

Q: Is this fiber geometry related to luster as well as whiteness, as the Harris Research Laboratories seem to have found out by their measurements?

A: I think it is and thus discount its effect for our problem.

EMPLOYMENT REGISTER

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55-1

Education: B S, textile engg.

Experience: finishing supervisor & salesman.

Age: 27; single; veteran; references; sales service position desired, location immaterial.

2-14, 2-28

55-2

Education: M A, chemistry, with additional year in statistics.

Experience: chemist, textiles & detergents.

Age: 42; single; veteran; references; position as chemist in production or applications research desired, northeastern or midwestern U S preferred.

2-14, 2-28

55-3

Education: B S, chemistry & dyeing.

Experience: dyer & chemist.

Age: 35; single; veteran; references; position as dyer or textile chemist desired, New England or elsewhere in northern U S preferred.

2-14, 2-28

55-4

Education: high school, with college courses in time study methods.

Experience: supervisor of textile finishing plant installation and operation, 28 years with one company now moved from area.

Age: 56; married; references; position supervising finishing operation up to dyeing desired, northeastern U S preferred but not essential.

2-14, 2-28

MEMBERSHIP APPLICATIONS

January 14, 1955

SENIOR

Sol Aronoff — Gen mgr, Commercial Dyers & Bleachers, Montreal, Quebec, Canada. Sponsors: E A Chevrette, I J Smith.

Emil W Bronke—Foreman of piece & yarn dyeing, Cheney Bros, Manchester, Conn. Sponsors: J J Cervini, T J Horan.

Harold R Bylsma—Research & development chemist, Dow Chemical Co, Midland, Mich. Sponsors: E D Serdynsky, A L Jankens.

Isaac P Davis—Complaints & Tech Records, American Viscose Corp, Marcus Hook, Pa. Sponsors: L L Walmsley, J A Woodruff.

Bhaskarrao R Desai—Dyeing, bleaching & finishing, Sidhpur Mills Co, Sidhpur, India.

(Concluded on page P107)

33rd Annual Convention
Printing of Textiles——

NEW DEVELOPMENTS IN VAT-DYE PRINTING*

ARTHUR K SAVILLE

E I du Pont de Nemours & Co, Inc
Wilmington, Del

The outstanding development in the field of vat dye printing is the modification of conventional methods of vat dye fixation to improve color yields and thereby reduce printing costs. Vat dyes are printed from neutral vehicles; the fabric is then impregnated with a caustic alkali-sodium hydrosulfite reducing system, and continuously steamed. Surprising economies in dyes and chemicals are achieved. The influence of various impregnation techniques, as well as the effect of time and conditions of steaming on the quality of print and dye yield, are discussed. Advantages of these techniques and their possible impact on the printing industry are noted.

INTRODUCTION

IN 1928 a process was introduced in Europe for the printing of vat dyes from neutral vehicles, drying the prints and developing them by padding with alkali and reducing agents followed by steaming. The introduction of this process dates the beginning of the technique we now refer to as the "Flash-Aging" or "Blotch" process for the development of vat-dye prints, a method which we and other suppliers are now endeavoring to establish in the trade and which is under active study in several print works today. The quarter-century lapse between the initial release of the idea and the present nearly practical runs is significant. It reflects the mental reservations of printers regarding the economic advantages of the technique over established methods and their doubts as to the practicality of mass-producing commercial prints by this process at any cost. The need of special equipment to operate the process on a practical scale has proved a further obstacle through the years to extensive mill-scale experimentation in this country.

GENERAL STUDY OF FLASH AGING

However, European textile printing plants have, for a considerable time, printed fabrics with vat-dye pigments and developed them by padding them through a conventional dye padder with a thickened mixture of alkali and reducing agents. Steaming followed the padding. Irrespective of whether a caustic soda-sodium hydrosulfite or a potash-"Sulfoxite" C reduction system is employed, the vat-dye printing paste is thickened with a mixture of alkali-coagulable gums to prevent flushing and bleeding in the padder or during steaming. The thickeners found most satisfactory in this process are methylcellulose and locust-bean gum or its derivatives. However, if used alone as a thickener for the dye, very poor color value is obtained, and in all cases starch is added to improve the yield. With this system the higher the proportion of coagulating material in the vat dye thickener the less the tendency of bleeding but the lower the color value; conversely, the higher the proportion of starch, the better the yield but the greater the tendency of the print's flushing and marking off during development. It will be realized, therefore, that the precise composition of the printing thickener will depend on the properties of the dyes printed, their ease of reduction, rate of dyeing, solubility of the leuco and their depth of shade; the type and weight of fabric used; on the local conditions, such as the manner of padding, dip or nip, the type of padder including size and hardness of the pad rolls, the temperature and composition of the pad liquor, and the temperature and condition of the steam in the ager. It will be realized, therefore, that the precise composition of the printing paste and the proportion of "protective" or coagulable gum will vary considerably from plant to plant, and, if optimum results are to be obtained, from pattern to pattern being printed. In practice the composition of the paste will vary between the wide limits of four parts of starch to one of gum and equal parts of starch and locust-bean thickener, all figured on a dry basis.

CHOICE OF THICKENERS——Because of the many factors that affect color value in printing, including degree of penetration of the print, pickup of paste by the engraving and transfer to the fabric, and the completeness of removal of the unfixed dye pigment, it is not easy to develop an accurate picture of the influence of thickeners on color value. However, on a logical basis it would seem that, when alkali-coagulable materials are used as thickeners, rate of dyeing will be lower than if an alkali-insensitive or alkali-soluble material is employed. When a vat dye is incorporated in a paste containing methylcellulose or locust-bean gum and padded in an alkaline solution, the thickener coagulates and encloses the dye particles in an insoluble envelope. It is understandable that this will retard the transfer of dye from thickener to fiber, and, in order to obtain full color value, the time of steaming must be increased over that required in the absence of this thickening.

A further disadvantage in the use of coagulating gums lies in the difficulty of completely removing them and with them the unfixed dye in the soaping which follows steaming. Should appreciable amounts of dye be left unfixed on the fiber bound only by the unremoved thickeners, the fastness to crocking and washing will be considerably impaired. Although methylcellulose and locust-bean gum are soluble in cold water, it is obvious that these slowly soluble materials will not be completely removed in the few seconds of cold rinse possible in an open soaper. That portion which is softened but remains on the fiber will be recoagulated by the hot alkaline soaping that follows and remains as an inefficient pigment binder for the residual vat-dye pigment on the fabric surface. This may give good color value but it will not result in a print fastness of the accustomed vat-dye standard. Because of a realization of the deficiencies in the use of these thickeners, a continuing study is in progress to evaluate and determine what vat-dye-pigment printing vehicle is most suitable for this work.

* Presented in the Pompeian Room of the Atlanta Biltmore Hotel in Atlanta, Georgia, on Friday morning, Sept 17, 1954, with Raphael Rupp presiding.

Conventional aqueous thickeners with a variety of additives may be used as well as emulsion systems of both the water-in-oil and oil-in-water types. In general, the results indicate that the lower the thickener solids and the lower the tendency to coagulate with alkali, the more rapid the fixation and the better the color value produced. The thickeners that have been found best in this regard are water-in-oil emulsions or oil-in-water emulsion vehicles. With these thickeners a surprising increase in color value over the best aqueous system is obtained.

As would be expected, since these thickeners are low in solids and contain no coagulating gums, appreciable flushing and bleeding occurs during laboratory chemical padding. However, an increase in the resin binder progressively lowers the tendency of the color to flush, and it seems probable that satisfactory emulsion formulations can be prepared which will give excellent color value and minimum flushing during padder development. This work confirms the belief that, if the vat-dye-pigment print is to be developed by padding with caustic and hydro on a conventional or modified dye padder and by steaming, and if prints equal in sharpness to those made conventionally are to be obtained, a vehicle which coagulates with alkali or which strongly bonds the pigment to the fiber must be employed.

By careful choice of the type and quantity of vat-pigment binder in the printing composition it is undoubtedly true that completely satisfactory prints can be obtained by padding and steaming. However, since the composition and therefore the properties of each vat dye are unique and different from every other vat dye, the best results will only be obtained by specific thickener formulations for each dye and perhaps for each dye strength. Compromises between maximum color value and sharpness of print are possible and indicated; but, by imposing conditions on the versatility of the process either by limiting the suitable dyes to a small selected range or by postulating the need for specific thickener compositions, the maximum potential of the technique is also limited. It is our fear that, if it is necessary to so limit the method, the control and testing requirements may be so expensive and time-consuming that flash aging in the United States will be limited to screen printing and specialty roller styles as it is in Europe.

Since the need of coagulating thickeners or other binders in the printing paste appeared to be the basic deficiency in the old wet-development process, the laboratory evaluated the technique with a view to eliminating the need for methylcellulose or locust-bean gum in the print thickener. Without special thickeners, impregnation of the printed fabrics with caustic and hydro did not appear feasible on conventional nip or dip padders. To obtain a liquor retention on the fabric low enough to prevent running and flushing in the steamer, high pressure on the padder was required. This increases the tendency towards mark-off on the padder bowls and accentuates color bleed caused by squeeze back at the nip. With the use of soluble gums, these difficulties are inherent in a padding operation where an excess of liquor is applied and then mechanically expressed to the desired pickup.

USE OF ALLOVER-ENGRAVED ROLLERS———Accordingly, numerous gums and thickening agents were evaluated under many systems and techniques for applying the alkali and reducing agent and with various kinds and conditions of steaming. From this work the most suitable method developed required the use of an over-all engraved roller for applying the thickened reducing agent, the dye being fixed in a saturated steam atmosphere.

Over-all engraved rolls are not novel in the printing industry. Peroxide or "Sitol" Flakes textile-processing agent have been "pin-padded" on rayon goods to be printed in discharge patterns for many years. The reducing agent lost from printed cotton articles by excessive standing before aging has often been restored by overprinting the whole fabric with a paste containing alkali and reducing agent, and with reasonable care the sharpness of mark of the print and the quality of the white has not been adversely affected by this second over-all printing operation. The same principle is used in our process except that, instead of using potash or soda ash as the alkali and sodium sulfoxylate as the reducing agent, as in the latter case, caustic soda and sodium hydrosulfite are overprinted on the previously vat-printed fabric. In practice, the fabric is printed in the conventional manner and dried. At some convenient time the cloth is led face down through a single-color printing machine or through a padder with an over-all engraved roll in place of the usual smooth bottom bowl where the thickened caustic soda and sodium hydrosulfite are applied to the fabric face. This engraved roller is furnished in the usual manner and doctored with a doctor blade or by other suitable means. The goods then immediately enter an air-free steamer where they are steamed for approximately 15 seconds at 214-216°F. The delivery end of the steamer is immersed in the first box of an open soaper, in which the goods are rinsed with cold water, oxidized and soaped.

By using an allover engraved roller for applying the reducing agent and alkali the choice of thickeners which can be used for printing the vat-dye pigment is extended. There is no need to use gums for printing the color which will coagulate in the presence of alkali. In fact, the use of methylcellulose or locust-bean gum is not indicated since these thickeners increase the time of steaming necessary to fix the dye. Any thickener can be employed depending on the particular quality of fabric or type of pattern being printed. Naturally, the color value obtained will depend to some extent on the particular thickener used, these relationships being similar to those existing in conventional printing. For instance, textile gum and alginates print smoothly with sharp mark but give inferior color value compared with thickeners containing starches. We believe the best compromise dye thickener for general use consists of a mixture of one part of 4% sodium alginate and three parts of 10% wheat starch. This is mixed with the dye paste to give a suitable printing viscosity.

The advantages of this thickener are that it is economical, has good flow properties, and the solids content of the paste is low. Printing thickeners have affinity for reduced vat dyes. With a low-solids paste, the amount of color absorbed by the thickener is less than with a high-solids paste, and the color value of the print is better. The absorption of caustic soda and sodium hydrosulfite in the chemical-impregnation step is facilitated, and the rate of transfer of vat leuco from carrier to cloth is increased with a low-solids vehicle. With this thickener, which contains only vat-dye pigment and no assistants or chemicals, the fabrics are printed in the conventional manner from standard equipment, and the goods are dried on cans or in a flue drier.

No restriction is placed on the choice of thickening agent in the chemical overprinting paste except that it be compatible with high concentrations of caustic soda and sodium hydrosulfite. Gum tragacanth, British gum, starch-British gum mixtures, textile gum or the newer etherified or esterified starches, such as Flotex, are satisfactory. The concentration of chemicals in the chemical paste necessary for full color development is related to the fabric being run and the depth of engraving used to apply the reagents. In practice, it is found that 5% of caustic soda and 5% sodium hydrosulfite, when applied at a 50 to 60% pickup from a suitable engraved crosshatch roll, is ample to develop light, medium, and heavy shades on the majority of fabrics. This figure is not critical, and up to 90% by weight of the chemical gum can be applied to the fabric without causing a tendency to flush during steaming.

STEAMER———We believe the most satisfactory design for a steamer is one constructed in the form of an inverted "U". This type of unit is simple and inexpensive to construct, and complete freedom from air is ensured when steam issues from the entry and exit lags of the steamer. It is naturally advantageous to have the fabric enter the steam atmosphere as rapidly as possible after impregnation to reduce the loss in sodium hydrosulfite on air exposure. Under air-free steaming conditions a 15-second treatment is sufficient to fix the dye on the majority of fabrics.

In this process the temperature of the steamer does not appear to influence the shade and strength of the finished print to any marked extent, at least within the operating limits of our laboratory equipment. A large number of dyes were printed, then steamed at a temperature of 214 and 250°F. While some dyes showed a slight increase in strength or brightness at the higher temperature, others were adversely affected but to a minor degree.

ADVANTAGES OF FINAL METHOD

Our findings have all been based on dye fixation in a moist steam atmosphere. Under other conditions of dry or superheated steam it is entirely possible that results contrary to ours may be observed.

Under proper operating conditions there is no flushing of the printed pattern, the unprinted areas are not stained or otherwise adversely affected. Full utilization of the printed color is obtained with a marked increase in color value over conventional prints. In addition, there are a number of relatively intangible factors in the finished cost which are favorably affected. The labor cost in a process where the goods can be continuously steamed, rinsed, oxidized, soaped and dried will be lower than where the rapid aging method is used.

Storage and moving of aged goods from ager to soaper is eliminated. Unlimited stability of the printed fabric allows more convenient vat printing. Scheduling of limited aging capacity is not necessary. The sometimes-high proportion of seconds caused in conventional printing from decomposition of the reducing agent before aging is eliminated. Furthermore, the steaming conditions are always constant, and the problem of shaded goods from temperature rising in the rapid ager in processing long runs is not encountered.

There are processing advantages, apart from color cost, in being able to extend the line of printing types to include all vat dyes.

The vat dyes presently used by the textile printing industry are those that have been found to give the best color values when applied by the conventional printing process. These same dyes, when printed and developed by the new technique, show an increase in color value of 10 to 50%. This increase in color value will be reflected in a lowered color cost of like degree. Therefore, even in using the conventional printing types the over-all color cost may be reduced by as much as 25 to 30%. This cost will be further reduced by selecting dyes that cannot now be printed but which show exceptional color value in this process. Among these are anthraquinone-type vat browns, reds, olives, and blacks. In addition to a decreased color cost, the brightness of all types in improved and the fastness to crocking and washing is significantly bettered.

It is surprising that the response of the roller-printing industry in the practical development and application of the flash technique is less than would have been expected from the promsied advantages to be gained. Nevertheless, several print shops are actively studying this program, and from trials in these promising results on several phases of the process have been forthcoming; it is hoped that in the near future the flash process for vat printing will come into widespread use. What particular vehicle, impregnation method, or development condition is found to be most suitable is not important. The need is for a method of making vat-color printing economically more attractive, thereby enabling fast-color prints to be offered on a competitive basis to the consumer. In this the wet-development process holds most promise.

Membership Applications———

(Concluded from page P104)

S Joseph Fantl—Dyer, Julius Kayser Co, Fountain Inn, S C. Sponsors: J F Ash, C L Baker.

Eric Gudgeon — Vice-pres and general mgr, Canadian Aniline & Extract Co, Hamilton, Ontario, Canada. Sponsors: W L Gudgeon, J Wallace.

Harry W Guenther—Chemical research section head, Coats & Clark, Inc, Newark, N J. Sponsors: E R McLean, P L Oertel.

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AATCC Symposium——

General Session*

CAMERON A BAKER, Chairman
United States Testing Company
Hoboken, N J

ROBERT C ALLISON, Cochairman
Geigy Chemical Corporation
New York, N Y

I. DRYCLEANING TECHNIQUES AND THE WORK OF THE AATCC COMMITTEE ON DRYCLEANING TEST METHODS

ALBERT E JOHNSON

Director of Trade Relations, National Institute of Drycleaning, New York, N Y
and
Chairman of AATCC Committee on Drycleaning Test Methods

A speaker for the drycleaning industry, who is at the same time Chairman of the AATCC Committee on setting up methods for testing the fastness of textiles to drycleaning, explains the general techniques employed commercially by drycleaners in the United States. He then discusses the accomplishments of the AATCC Committee in correlating test methods with practical drycleaning, the methods being especially satisfactory for dyeings and prints produced by true dyeing methods. The most work remains to be done with pigment, lacquer, and flock prints, in the case of which abrasion is so important.

INTRODUCTION

INCREASING emphasis is being placed upon evaluations by AATCC test methods in terms of end use, and greater attention is being directed in AATCC research to the correlation of laboratory results with results obtained under actual conditions of service.

In line with this policy the Committee on Test Methods was formed three years ago. Its work from the start has been the investigation of the correlation of the existing test procedures with actual drycleaning operations with a view to making any corrections in these procedures as may be found necessary and to developing such new tests as investigation may disclose are required.

Industry experience in dealing with end-use serviceability problems is pointing up with increasing urgency the need to better understand the problems of apparel cleaning by drycleaning methods especially in reference to the performance of textile finishes. To evaluate these and other performance characteristics of textiles in drycleaning properly, some refinement of existing procedures is indicated and several new methods need to be developed.

The Committee has made considerable progress in assembling information on the performance of a wide variety of textile products in drycleaning processes and in the development of an experimental procedure utilizing the apparatus employed in the new "A" series of washfastness tests. The proceedure holds considerable promise of being better adapted to testing a broader range of fabric properties in closer correlation with actual drycleaning conditions.

In reviewing the work of the Committee it is necessary to discuss in some detail those aspects of drycleaning processes that have a bearing upon the more common problems of fabric performance in commercial drycleaning services. The discussion to follow should also serve to answer many of the current questions about drycleaning among those who may read this paper.

SOME DETAILS OF DRYCLEANING PROCESSES

The over-all service of drycleaning as the consumer regards the term is difficult to define with any real meaning to the textile technician who is interested in evaluating a fabric for drycleanability. A number of operations are involved, depending upon the condition of the garment brought in for servicing, in each of which certain problems of fabric performance may arise. Drycleaning — the basic operation around which the entire service functions—is the use of a mechanical washer not unlike that of a commercial laundry machine. The difference is that, instead of water, the washing fluid is an organic solvent. But, like laundering, a soap or synthetic detergent is generally added to the solvent along with traces of water to improve the detergency of the washing solution.

The machines in use and in current manufacture differ substantially in design and operational characteristics. But all are based upon the principle of rotation washing, in which a given weight of clothing according to machine specifications is tumbled about in the solvent. The action of lifting and dropping the load with each rotation introduces the kind of rubbing and pounding motion that has long been the accepted principle of mechanical washing in both the laundering and drycleaning fields.

The two basic types of solvent in use are Stoddard solvent, a petroleum fraction refined to US Commercial standard 3-40, and perchlorethylene, a nonflammable synthetic organic product. A higher-boiling range petroleum solvent is also used, called 140°F solvent. It is likewise refined to a commercial standard to meet the requirements of the drycleaning industry. Carbon tetrachloride is used but to a very limited extent today. Perchlorethylene is specified in all new equipment for synthetic solvent used in the US and Canada.

For those who have interests abroad it may be well to point out that trichlorethylene is extensively used on the Continent and in the British Isles. This is important to keep in mind in testing the

* The General Session, comprising four papers, was presented as part of an all-day AATCC Symposium on May 19, 1954 at the Hotel Statler, New York, N. Y.

colorfastness of textiles intended for export. Whereas very few dyes are affected by perchlorethylene, quite a number bleed in trichlorethylene.

It is not necessary here to discuss the operational differences of the mechanical equipment designed for each of the two basic types of solvents. They are substantially different in some respects, but both perform the same basic functions of first washing, then extracting the solvent in a centrifugal, and finally evaporating residual solvent by a tumbling action in the presence of fast moving air heated to a maximum of 160°F. For our purpose we need only keep in mind that mechanical washing is the basic operation of drycleaning.

I should say here for those who are interested that the solvent in both systems is recovered and reused. During the washing and rinsing cycles the solvent undergoes constant filtration with activated carbon or other adsorbent added to remove soluble matter. Insoluble materials are trapped off by the filter. In most well-organized cleaning establishments the solvent is periodically reconditioned in distillation units to bring it back to its original state of delivered purity.

A considerable number of detergents are manufactured for use in drycleaning systems, and these may be divided into two broad categories: fatty-acid products and synthetic detergents. Anyone who is familiar with the soap industry knows something of the differences in the formulation of such products—not unlike the manufacture of textile finishes.

We do not intend to cover this complex subject in any detail, however, with the exception of "charged-system" products, as the Committee has not found that the detergents themselves have any important influence upon fabric properties or that, where a contrary experience is indicated, it is more likely to be the moisture content of the detergent solution that is responsible, a factor in which the detergent functions primarily as a suspension or coupling medium.

It has long been a practice in drycleaning to add small traces of water to the solvent, the detergent forming a water-in-oil emulsion. In the case of fatty-acid products, a fresh supply of soap is added with the water to each load of garments put in the washer. In this so-called "batch" system, the soap is trapped off by the filter along with the soil, distillation and adsorbents or "sweetening" products being relied upon to purge out the traces of fatty acids that remain dissolved in the solvent.

In these systems the water is absorbed by the garments and by the water-soluble soil in them. The addition of water is then with good reason. Many of the small stains on consumer apparel and a considerable amount of the more widely dispersed soil in clothing, such as perspiration, are insoluble in organic solvents. With even small traces of water (usually less than 3% on the weight of the load) an appreciable amount of this otherwise insoluble soil is removed, and the need for subsequent stain removal work and wet cleaning is reduced.

CHARGED SYSTEMS——Until about three years ago when the Committee began its work, most cleaning systems employed the "batch" soap principle of detergency. Since then the new synthetic detergents have largely taken over in what are popularly known as "charged systems". As these systems are not yet too well understood outside the cleaning industry, a word about them is timely.

A "charged system" is one in which the solvent is always "charged" with a given concentration of detergent. With this large amount of detergent, larger dosages of water can be added to the system without danger of the garment load becoming wet as in batch methods. These new detergents have the property of holding water in solution rather than in suspension or emulsion.

These detergents are used in both petroleum- and chlorinated-hydrocarbon-solvent machines. Varying percentages of concentration are in use depending upon the type of equipment one has. In some plants the "charge" is ¾ to 1%, in others 2%, and in specially designed machines the ratio of detergent to solvent is maintained at approximately 4% by volume.

In "charged systems" the water added is not absorbed entirely by the load, but rather the vapor pressure of water in the solvent attains equilibrium with the fabrics being drycleaned in much the same way a textile attains equilibrium with air having a given relative humidity. This being the case, the operator of drycleaning equipment is no longer concerned with the actual volume of water added to each load, but rather watches the vapor pressure of the water in his solvent by means of special equipment, adding any necessary water and detergent from time to time to maintain proper conditions.

I am proud to say here that the research responsible for the discovery and application of this principle was done by the National Institute of Drycleaning under the direction of George P Fulton, Director of Research. In recent data published by NID, Fulton revealed that a solvent "relative humidity" of 75% is ideal from the standpoint of efficient water-soluble soil removal and control of shrinkage with the exception of soft woolen fabrics, which show greater dimensional stability at 65% rh.

Charged systems owe their popularity to their more efficient performance in soil removal. Charged systems have sharply reduced the need for individual treatment of water-soluble stains and has greatly reduced wet cleaning. Some plants report having completely abandoned their wet-cleaning departments because their new methods now remove soil so efficiently.

A recent study of NID Analysis Dept records shows that most of the complaints reported so far involving charged systems have been due to shrinkage but that, where this has been the case, the systems were found lacking in the necessary controls of moisture content; that, had the systems been operated properly—as will be the case in time when control devices are more widely used and drycleaners become more accustomed to working with these relatively new systems—complaints of shrinkage should again become nominal. It is important to note further here that no increase in dye-fastness complaints has taken place because of charge-system methods, and that a small percentage of complaints continues to be reported because of recurring instances of solvent-soluble dyes.

VARIABLES IN OPERATING PRACTICES——It is well to keep in mind that the conditions imposed upon textiles in drycleaning could not possibly be constant among the 30,000 establishments in the United States, which operate a variety of machine designs of different load capacities and wherein the factors of running time, type and use of detergents, solvent level, moisture content and the make-up of the garment load itself—to mention only a few of the variables that could be listed—make it unlikely that any two plants are exactly alike. Doubtless the same could be said about dyeing and finishing plants. Consequently, a critical fabric—one which does not possess a margin of safety against the extremes of conditions to be found in a broad selection of plants—may exhibit satisfactory durability in one cleaning system and not in another.

The Committee observed this in a group of 13 fabrics which were overprinted with either flocking materials or metallic colors, and in some cases both. These were given five successive drycleanings in six plants having excellent operating records, each of which, however, practices a different operating procedure. Also, two runs were made in petroleum and synthetic-solvent systems at the National Institute of Drycleaning. The fabrics were selected because they were suspected of having printed patterns of limited durability to repeated cleanings. Six of the samples survived all runs without appreciable loss of print materials. Four others went through all runs with only slight effect upon the print in two of the plants. The

remaining three were appreciably damaged by all plants using perchlorethylene solvent, not noticeably affected in one of the petroleum-solvent plants, and only slightly affected in the remaining plants. This type of field testing will be made again shortly by the Committee covering a broader range of fabric properties, but reference was made here to the previous work to illustrate the problem of establishing a proper relationship between the behavior of critical fabrics in drycleaning systems and the operating procedures involved. The same problem was met and overcome, I might say, by the Committee on Washfastness in setting up the A series of tests.

DYES NOT AFFECTED IN TESTS ———I think it important to make another observation here based on the Committee's findings. It is that, among the some 55 fabrics of all kinds that have been submitted to five successive drycleanings, none of the dyed or dye-printed samples showed more than a faintly perceptible change in shade or character. In no case did this amount to more than a "no appreciable change" rating. It was observed also that the crisp-finished fabrics exhibited a noticeable change of hand by the third cycle of cleaning, the same point at which the faintly perceptible change in color first occurred. Reference is made again to this finding in the Committee's conclusions to be summarized later.

STAIN REMOVAL———So far we have talked only about the basic operation of the drycleaning process, that of washing textile products in organic solvents by means of mechanical washing systems. Consumer stains that remain in the fabric after this washing are now individually treated. Chemical stains require chemical means for removal. Water-soluble stains that fail to yield to the initial process are generally just dissolved with water with the help of some mechanical means of breaking up the deposit. The use of chemicals for stain removal is an accepted responsibility of the cleaner, but, without the freedom of applying water to the fabric, all water-soluble stains and many of the chemical types where water is a component of the removal treatment cannot be removed. For practical serviceability then, a fabric must withstand this kind of contact with water. In yarn-dyed constructions in which one or more of the dyed yarns are fugitive, color staining of the other fibers occurs when wet out with water. The problems on this score, however, generally involve only the highly fugitive dyes and finishes, which are problems also in ordinary consumer service where water contact is not an infrequent occurence.

WETCLEANING———Though wetcleaning volume has been reduced by the increased efficiency of drycleaning systems, some people get some of their garments into such a condition that the limited detergency powers of even the most efficient drycleaning system will fail to clean them satisfactorily. This is largely because of deeply ingrained insoluble soil or excessive water-soluble soil. The types of clothing most likely to be wetcleaned after drycleaning are men's trousers that have been worn a great deal or used for work, raincoats and other weather-protection apparel, dresses and slacks used for housework or active play, and sports shirts that become heavily soiled with perspiration. A good wetcleaner knows from long experience what the behavior problems in such treatment will be and adapts a procedure which will avoid difficulty.

DRYING OR DEODORIZING——— In all drycleaning systems, the garment load is wizzed in an extractor to drain off as much solvent as possible after the washing procedure. This leaves the fabric in a solvent-damp or semidry state. The complete removal of residual solvent —a process also known as deodorizing— is accomplished by tumbling in a drying unit which rotates the load in a leisurely manner in the presence of fast moving air heated to a maximum of 160°F. The periods of tumbling vary from a few minutes in synthetic solvent systems to 25-30 minutes in systems using the slower-evaporating petroleum products.

The control of tumbling temperatures is important as excessive heat and mechanical action may combine to induce shrinkage in some fabrics. A temperature of 140°F or less is preferred for soft woolen garments and others where shrinkage is a critical hazard. Fragile fabrics and others that do not withstand mechanical handling well are hung-dry in rooms or in special drying cabinet equipment.

PRESSING———The final stage of garment renovation is, of course, pressing. The cleaning industry is pretty well standarized on a 65-lb steam pressure, by which presses and other finishing equipment are heated. At this pressure the maximum temperature would be about 290°F. Hand irons are used only on women's apparel requiring special hand work. These irons are electrically heated, thermostatically controlled and supplied with steam for use when necessary.

SUMMARY OF COMMITTEE WORK

The Committee, as indicated, has done a great deal of work both in the field and through the facilities of AATCC's Research Headquarters. Without this help we would never have made the progress we can now report. Though we have a long way to go yet, we are coming close to the time when we can make specific recommendations.

At a recent meeting the Committee made a thorough review of its work to date. To conclude this paper we quote as follows the summary of that meeting as contained in the minutes; the summary appears as the principal points of agreement and understanding reached by the Committee:

1) that the present AATCC color fastness tests appear adequate for evaluating dye prints and dyeings, with only minor adjustments needed perhaps to bring it up to date. Possible exceptions are screen prints.

2) that the present colorfastness test is not adequate for evaluating pigment prints, lacquer prints, flocking and all other forms of overprinting or fabric finishing not achieved with dyes in the usual sense; that these effects are subject to the deleterious action of washer abrasion, which is not simulated in the colorfastness test.

3) that the ideal test is one which combines all of the essential factors common to commercial practice and can be used with possibly only minor modifications in procedure for most testing purposes, these including retention of finish, colorfastness and durability of overprints. (A shrinkage test would involve necessarily a different procedure because of the larger specimens required and the effect of moisture variables).

4) that test results so far have shown that perchlorethylene is the organic solvent best suited for test purposes.

5) that, since the purpose of a drycleaning test is limited to determinations of the resistance of materials to the conditions of commercial cleaning operations, the use of a drycleaning soap in the test is not an absolute requirement; that the principal consideration is that the results of the test reproduce the results obtained in an average run of commercial cleanings as closely as possible. (It was emphasized that the soap factor may be found to be important in certain types of evaluations, and in those cases the effect of different soap formulas must be given consideration).

6) that a small amount of water in the test solution has been shown in past work to be required in some cases to bring the test into better correlation with commercial practice; that this was indicated in the case of fabrics having heat-embossed patterns and finishes which are affected by moisture as used in commercial practice.

7) that the laboratory work to date on overprints with the use of Inconel metal cylinders in a Launder-Ometer

seems to yield reliable, reproducible results having good correlation with each of five cycles of commercial cleanings (see footnote †).

8) that the "charged system" type of cleaning, now very common in the drycleaning industry, has not introduced any new problems of colorfastness in dyed or dye-printed fabrics because of the higher moisture content of the system as compared with the predecessor "batch soap" methods; that, because of a lack of adequate control in some cases in the use of moisture, some increase in wool-shrinkage complaints have been noted but that actually shrinkage is well controlled in properly run systems; that the Committee's work of correlating laboratory and plant conditions must be on the basis of properly run systems of dry cleaning; that the maximum water present in such systems is equal to that of the moisture regain of textiles conditioned in an atmosphere of 75% relative humidity and 70°F; and that a possible means of introducing moisture to a test procedure may be by atmospheric conditioning, especially in a shrinkage test where the desirable moisture level drops to 65% relative humidity or standard conditions.

9) that, based on results so far obtained, three commercial drycleanings is an adequate number to correlate with in a test procedure, as any fabric that withstands this number without appreciable change is likely to withstand several more cycles without excessive impairment.

10) that a drycleaning test should provide some means of grading these results to show classes of fastness or durability or, as in the case of washfastness, that several grades of cleaning procedure be specified.

11) and, finally, that the Committee is considerably advanced in its laboratory program as compared with work in the field.

† The test used experimentally in the most recent work on flock and metallic prints is as follows:

Same apparatus as in A series of washfastness tests
150 ml perchlorethylene
200 steel balls
6" x 6" specimen with multifiber test cloth
Each 10 minutes running time is approximately equal to one cycle of average drycleaning
When water is to be added, the most practical amount is 0.5 ml with 0.05 ml Aerosol OT 25% clear.

CONCLUSION

The Committee has acted to conduct another program of field tests in cooperation with all other committees that have an interest in drycleaning procedures. A meeting of the chairmen of these committees was held recently and plans are going forward to complete the project as soon as possible. With the new data AATCC's research staff will undertake the development of suitable test procedures.

DISCUSSION

Question: Which is more severe on colors and finishes in drycleaning, Stoddard solvent or perchloroethylene?

Answer: Perchloroethylene. A review of our experience over many years leads us to the conclusion that *any* dyestuff fast to perchloroethylene will be fast to Stoddard solvent; however, the reverse is not true. Perchloroethylene apparently has a greater solvent effect on both dyes and finishes.

Q: But you say that all new installations are being set up for the use of perchloroethylene?

A: No, what I say is that about 30% of all plants are using a chlorinated hydrocarbon solvent, and practically all new installations for the use of a chlorinated solvent are using perchloroethylene.

Q: Does carbon tetrachloride have the same effect on color fastness as perchloroethylene?

A: I think the action of carbon tetrachloride is somewhat more severe. Our tests indicate that it removes more color and especially also more finishing materials, more pigment, and more flock.

Q: Does wetcleaning affect water repellency?

A: No, not generally.

Q: Does that mean that drycleaning by the charge system must be followed by rinsing?

A: The leaving of detergents of any kind in textiles certainly decreases water repellency. We recognize this and instruct the industry to rinse out soap and other detergents as thoroughly as possible. One thing defeats us, however, and that is that detergents often cling tenaciously, and any traces impair repellency.

Q: Is there then no way to wet clean without some loss of repellency?

A: Water repellency may indeed be decreased by detergent left in a textile after a drycleaning procedure, and although rinsing may improve the situation, that is not always practical after drycleaning. Wetcleaning or thorough rinsing after drycleaning may cause damage to some types of garments, such as lined or insulated jackets. We have given much thought to this problem, but it is very complex and withal quite difficult.

II. STATIC ELECTRICITY IN TEXTILES

KENNETH H BARNARD
American Cyanamid Company
Bound Brook, N J

The impact of static electricity in textiles on both the average consumer and the processor of textiles is discussed. Some cures are indicated. The evaluation of antistatic treatments by resistivity measurements is recommended by a Research Committee of AATCC.

INTRODUCTION

TO those in the business of dyeing and finishing textiles, static electricity is merely something that causes that unpleasant tingle when a moving piece of nylon or acetate cloth is touched. To the women who design or merchandise dresses, it is that which causes a synthetic slip to cling around the legs instead of draping gracefully. However, a static problem of even more immediate interest occurs in hospital operating rooms. The sudden swish of a nurse's nylon uniform has been known to produce a spark fatal to a patient whose lungs are filled with an explosive anaesthetic. Data on the frequency of such catastrophies are rather incomplete as naturally they are not advertised, but 300 deaths a year have been reported. This hazard is well known to the medical profession. The better and more modern hospitals have special floors in their operating rooms made electrically conductive, the surgeons and nurses wear conductive shoes, cotton uniforms are required, the air is humidified, etc. Incidentally, even if a nurse wears a cotton uniform, a nylon slip underneath it can still cause trouble. Safety here as elsewhere depends on constant vigilance.

There are other less common activities, already rated as hazardous, which are made the more so by static. An army pilot, five miles up and forced to bail out, can be in a tough spot if static, generated by the quick release of his nylon

parachute, holds the folded pleats of the cloth together so that it will not open. The extreme cold and dryness up there of course intensifies the problem. Other places where static is given very careful consideration are arsenals and powder-loading plants. All the armed services appreciate these problems, are actively working on them with the best experts, and are successful in avoiding most accidents.

While the number of people who parachute out of planes, load shells or even undergo operations is relatively small, many people travel by aeroplane and are unwittingly concerned with static. A plane flying rapidly through the air and insulated from the ground can build up high potentials, so that corona discharges occur. These form ozone, and when they occur on the tires, a microscopic honeycombing of the rubber results. A tire that has originally passed the severe acceptance tests required by the air transport companies may be so weakened by static as to blow out on landing, and yet the tire shows no outward damage.

These are some of the dramatic manifestations of static, the kind that make the newspaper headlines. But the mill man is interested in the much more frequent daily difficulties that static causes him. His troubles were minor while cotton, viscose rayon and wool were the fibers he processed but became more numerous with the growth and use of the newer synthetics. Nylon and acetate have been mentioned, but merely because they are in more common use today. All the other synthetic fibers, which are in general much more hydrophobic, present the same problems in slightly differing degrees. As the use of such fibers increase and the interest in them continues to accelerate, so too will the problems in eliminating static become of increasing importance.

In a mill running synthetic blends, static is a constant source of trouble whenever a fiber, yarn or fabric rubs over itself or over a bar, roll, spreader, etc, especially if the atmosphere is cold or dry. Fibers can either fly apart or cling together, yarns balloon and misalign on the warper or run over the flanges. In tentering or calendering fabrics, the cloth refuses to pleat down in the box because of static and spills out on the floor, and a workman trying to push it back gets a painful shock. Corduroy and plush mills are bothered with lint from the air attracted to the cloth by static, and this lint discolors the cloth.

Similar troubles show up on the consumer level but with variations. Many hotels have complaints from guests who get an electric shock when inserting pass keys in the door or while ringing for the elevator. Static is generated by the guest in walking across synthetic carpets. The combination of a fur coat and a saran seat cover on a winter day is a common hazard in automobiling. Static noises on the car radio are frequent. Gasoline trucks trail a metal chain to the ground to drain off the static, which can start a fire otherwise when they unload. Static in a synthetic slip can cause embarrassment if it clings instead of drapes, or it can turn a woman's smooth coiffure into something approaching that of a Fiji Islander when the slip comes off over her head. These illustrations suffice to show how common static troubles can be.

THEORY

Although static has been known ever since the ancient Greeks electrified pith balls by rubbing amber with a silk cloth, not too much is actually known about it. Modern theory has every known material made up of submicroscopic particles called molecules, and these in turn, of atoms of the chemical elements. These atoms consist of positively charged protons, uncharged neutrons and negatively charged electrons. The amount and nature of these will vary from one atom to another, therefore, when one kind of atom comes in contact with another, it can lose some of its negatively charged electrons to an atom having an excess of positively charged protons. If the two atoms are suddenly separated, one may have an excess of positively or negatively charged ions. Friction is not necessary to the production of static, but it can magnify the effect through increasing the area and degree of contact. Different atoms carry different electrical charges, so that one can arrange the fibers which are made up of different combinations of atoms, in a sort of scale from the most positively charged to the most negatively charged. This is the triboelectric series, and in it glass, hair, nylon and wool are up at the positive end; paper, steel and rubber intermediate; while acetate, Orlon, Saran, etc are at the opposite, or negative end. One might think that this series would determine the magnitude, or potential, of the charge induced. Thus, by rubbing glass at the top of the series with Saran at the negative end, the maximum voltage should be produced; however, it is not quite so simple as that.

STATIC ELIMINATION

Even with such a sketchy outline of the theory of static production, it is possible to suggest some remedies. First, by mechanical means: the machines where static occurs can be grounded electrically. Friction of the cloth or fiber against itself or against guides or rolls can be reduced by a lubricant. While friction alone is not the primary cause of static, it is indirectly a cause through promoting closer contact.

Secondly, by ionizing the air thus producing an atmosphere surcharged with positive and negative ions, which will neutralize opposite charges on the cloth or fiber. The air can be ionized near the seat of the trouble by a high-voltage discharge or by the use of radioactive materials usually fixed as a thin film on a bar or plate over which the cloth must pass.

Thirdly, by increasing the electrical conductance of the cloth or fiber. This could be done by fixing electrically conductive materials on the textile, such as metallic particles, carbon black, etc, but is more suitably done by using chemicals that attract a layer of water to its surface.

Moisture is the bane of the electrical engineer trying to keep his electrical energy from escaping through insulation. Conversely, water is a blessing to the fiber chemist striving to dissipate static charges. Emphasis has been placed on the fact that static troubles occur more frequently with the newer hydrophobic fibers than with the older ones, which have higher regain-moisture contents. Regain and static are related qualitatively but not quantitatively, however, as wool is more subject to static than cotton, although wool has the higher regain. There is a quantitative relationship between the electrical resistivity of any one fiber and its regain moisture. By changing the relative humidity under which a fabric is tested from a high figure of around 85% rh to a low value of perhaps 25% rh, the resistivity will increase as much as a thousandfold. Moisture in the air, hence moisture in the goods, is the biggest single factor affecting its resistivity.

Hayek of Du Pont in his article on "Antistatic Finishes For Textiles" *(1)* lists a variety of chemicals, patented and in use as antistatic agents, which represent almost every type of chemical compounds: inorganic salts, esters, alcohols, amines, amides, quaternary ammonium salts, alkyl phosphates, etc. In spite of their wide divergencies in composition, he points out that they all have one common characteristic: they all absorb or combine with water to form a conductive surface layer. He postulates that they have a functional or polar group which attracts water. If this group can be so fixed to the fiber that it is oriented towards the surface, a surface layer of water will result. However, if the hydroxyl group of cellulose for example proves more attractive, the orientation may bring a hydrophobic group to the surface and the additive will repel

moisture rather than attract it. So it is possible that the same antistatic agent, an alcohol phosphate, which effectively reduces the static tendencies of Orlon and Dacron will make ordinary cotton a static producer. Perhaps this kind of static elimination can best be summed up by a crude analogy: filling a pail with water will prove difficult if there is a large hole in the bottom of it. So, building up a large static charge on a fabric is impossible if it can be made sufficiently conductive.

EVALUATION OF ANTISTATIC TREATMENTS

The problem of static is more or less incidental to a bigger problem which is basic for this entire symposium. This broader problem is that of finding laboratory means of evaluating some specific textile characteristic so that the fabric's use, or useful life, may be determined in advance. Some sort of yardstick is needed to measure this quality, a yardstick that is accurate, convenient, trustworthy, quick and mutually satisfactory to buyer and seller alike.

How was this broader problem met in the case of evaluating static treatments? There are dozens of chemical companies from the very biggest to the smallest who are producing antistatic products. Two years ago there was no generally accepted method for evaluating them. Each laboratory had its own method, which varied from a simple gold-leaf electroscope to a complicated machine designed to rub a sample cloth a certain way for a certain length of time with a specific abradent and under a set pressure and then to measure the potential produced or to measure the dissipation time to give half the original voltage, the so-called "half-life test." So many different methods were tried, and there was such a lack of agreement in this field, that at least one expert said it was impossible to get any satisfactory laboratory test method, and the only way to test antistatic treatments was an actual field test in the mill, a slow and expensive process.

From an electrical testing standpoint there are two possible things to measure:

1) The electrical resistance of the fabric or yarn.
2) The potential developed when the fabric is rubbed.

The second possibility contains so many variables that it is obvious that the simpler one should be explored first. Also, since electrical measurements may show variations of a thousandfold because of changes in humidity, it is clear that a tight control of humidity both in conditioning and during the testing of the samples must be maintained. Even those laboratories that had done some work on measuring resistivities of fabrics had no common language in reporting their results. The resistance figures in ohms per square ran to astronomical numbers ranging from 10 with 8 zeros after it to 10 followed by 16 zeros. Simplification in reporting results was another desirable objective.

The AATCC recognized the importance of the problem and has always furnished a forum where competitive producers or consumers could get together in the common interest of developing a method and a language for reporting results. So, a committee was formed consisting of technical men from both the chemical companies producing antistatic finishes and from the mills using them. While each producer is naturally interested in the efficacy of his own particular product, the Committee as a whole had no interest in how one product differed from another either chemically or as a static eliminator. As they only wanted a series of samples ranging from good to bad as an antistatic, all samples were coded to conceal their identity. Some twelve men started work about two years ago, and the group has now grown to fifty. Numerous cloth samples were distributed and tested, and frequent meetings and discussions were held in order to try and work out a standard method. It was soon decided that the easiest and best method was that of measuring the electrical resistance of the treated fabrics. After about three rounds of round-robin tests, a tentative method was evolved, and it was agreed to give it a trial. Sixteen different fabrics representing six commercial treatments plus the original untreated nylon and acetate fabrics were circulated among a dozen co-operating laboratories, and all were tested for their resistivities by the proposed method. Further, it was agreed that the resistance in ohms per square should be reported as the logarithmic value of the ohmic resistance in much the same way the pH, or recripocal of the hydrogen ion concentration, is customarily reported. All tests were to be run at three different humidity levels. The results from all the laboratories are shown in Table I, agreement among which was quite good.

TABLE I

AATCC INTERLABORATORY TESTS OF SURFACE RESISTIVITY

Logarithm of Resistivity in Ohms per Square

Relative Humidity	25%				35%	65%					
Laboratories	Celanese	Dow	DuPont	General	Cyanamid	Celanese	Ciba	Cyanamid	Dow	DuPont	General
Fabric Samples*											
CU	13.1	12.9	12.3	12.7	11.9	10.4	10.7	10.2	10.1	10.5	10.2
NU	13.1	12.0	12.3	12.6	11.8	10.7	10.8	10.3	10.3	11.0	10.7
AU	14.8	12.5	13.3	14.9	12.9	14.3	15.0	12.0	12.8	13.3	14.0
AA	11.9	11.9	12.1	11.7	11.5	11.3	11.5	9.8	10.9	11.2	10.8
AB	13.6	12.2	13.0	12.7	12.1	11.7	12.6	11.0	10.1	11.5	11.2
AC	10.0	9.7	9.8	9.7	9.1	8.5	9.0	8.3	8.9	8.8	8.4
AD	10.1	9.7	9.8	10.3	9.4	8.4	8.9	8.3	8.5	8.6	8.8
AE	11.1	10.4	10.6	10.6	9.8	10.0	9.8	8.7	8.8	9.0	9.0
AF	11.5	11.0	11.0	10.8	9.5	10.0	10.2	9.3	9.5	9.6	9.4
NU	15.0	12.0	13.5	15.0	12.9	14.7	15.0	12.4	13.3	14.4	14.1
NA	10.6	11.2	11.1	11.1	10.8	10.2	10.4	10.1	10.0	9.8	9.9
NB	14.9	12.8	13.4	14.7	12.9	13.0	13.4	11.9	11.7	12.1	12.2
NC	10.8	10.5	10.1	10.5	9.6	8.9	9.7	8.6	9.1	8.8	9.1
ND	10.2	10.1	9.6	10.0	9.4	9.4	9.0	8.5	8.8	8.4	8.6
NE	12.2	10.9	11.0	11.4	10.3	9.9	10.5	9.2	9.1	9.2	9.5
NF	11.2	10.9	10.8	10.9	10.6	10.0	10.3	9.6	9.5	9.4	9.6

* Code: The first letter denotes the fiber:—A-acetate, C-cotton, N-nylon, and R-rayon. The second letter denotes which one of the six commercial antistatic treatments was applied: A, B, C, D, E or F; U denotes untreated sample.

Considering how far apart these same laboratories were before this Committee started work, the present agreement among them is remarkable, especially as each laboratory was using its own equipment, which differed from that of the others. The method was accepted by the Committee as a tentative standard and will be published as such in the 1954 issue of the "AATCC Technical Manual and Year Book." Meanwhile, it is being used by several companies as an effective way of evaluating in the laboratory the antistatic products in which they are interested.

In offering this method as a tentative standard, the Committee realizes that the measurement of electrical resistivity is not the only factor in evaluating an antistatic finish. Neither is tensile strength the only factor of interest for dress goods. However, resistivity is certainly *one* factor and an important one, and work is now in progress towards applying similar measurements to yarns as well as cloth. At least, thanks to the work of this group, another and a different sort of a yardstick has been developed for textiles.

REFERENCE

(1) Mason Hayek, "Antistatic Finishes for Textiles", *Am Dyestuff Reptr* 43, P168 (1954).

AATCC RAPID CONTROL TESTS

Simplified Tests for Fabric Properties

THOMAS G HAWLEY
United Merchants Laboratories, Inc
New York, N Y

The Chairman of the AATCC Research Committee on Simplified Control Tests points out how tests of consumer fabrics are important to mills, converters, retailers and consumers. However, since many responsible for consumer fabrics have neither the laboratory equipment nor the time to carry out full testing methods, it is desirable to have simplified methods that require very little time or specialized equipment. The simplicity of the methods is explained.

THERE are many properties that are desirable and sometimes essential for satisfactory consumer fabrics. AATCC has had active research committees working for 30 years to devise and improve methods of measuring as many as possible of these properties. Test methods that are accurate and reproducible by different men in different laboratories are essential if anyone is really to know how resistant a fabric is to shrinking, to fading from light, to fading from gas, to bleeding in washing, to bleeding from perspiration, and to the other service conditions it must meet.

I suppose, before proceeding too far on the subject of simplified tests, it would be worthwhile to point out briefly why it is to the advantage of those handling fabrics to test their fabrics at all. If converters do not test, they take several sizeable risks. Their customers may test and reject a fabric that the converter cannot then dispose of profitably elsewhere. Their customers may not test the goods, but may find some major flaw after cutting and make this flaw the basis of a claim. Goods already cut cannot readily be put to other uses. Their customers may not find flaws, but the ultimate consumer may find one or more. If this happens, the defective garments quickly find their way back to the converter. Beside the cases where immediate trouble is the result of inferior fabrics, there are many cases where the reputation of all who handle the inferior goods suffers, but no actual claims are made. If no converters tested, one man would be in as good a position as his neighbor, but, since an ever-increasing number do test before bringing out new fabrics, it puts those who do not test in the position of trying to justify not knowing something they could have easily found out.

It is even more necessary for finishing plants to test their fabrics, since they are one step farther back on the chain. Garment cutters do not generally carry out extensive tests, but, I believe, they would have less trouble if they did more testing, especially on new products. The very large chain and department stores test very thoroughly. Smaller stores seem to do very little testing. The ultimate consumer very rarely does any testing, but if the fabrics do not perform up to his expectations, he complains or buys elsewhere the next time, or does both.

About four years ago the idea was advanced by AATCC that it would be very desirable to have tests such that some fabric properties could be reasonably well measured in a very few minutes without using specialized equipment. Therefore, a committee on "Simplified Wet Control Tests" was created to encourage the development of such tests. Actual work started soon after and is still under way. This has been done by the Committee, by the AATCC Laboratory at Lowell, Mass, and by other people who were interested.

Practically everyone familiar with textiles has a few quick tests to give an idea of fabric properties. One is bursting the fabric in the fingers to measure tensile strength roughly; another is roughly measuring abrasion resistance by rubbing with a coin; another is roughly measuring resistance to shifting, or slipping, by sliding the fingers across warp or filling; another is rubbing with a handkerchief to get a rough idea of the resistance to crocking. These and other similar tests are very useful, but all depend to a very great degree on a nonstandardizable human factor. When we refer to simplified tests we do not mean this type of test, we mean simple, quick tests, but still tests which largely eliminate the human factor. Of course, one of the most important quick tests of all is that for hand, and this is one place where the present, longer, more standardized tests (except the creaseproofing test) are generally not better, but worse.

The 1954 Technical Manual and Yearbook of the AATCC has four methods listed. The main piece of equipment around which this work has been centered is the ordinary electric iron. With this and a blotter a given fabric can be tested in five minutes for loss of color in low-temperature washing, perspiration, or gas fading.

The procedure is approximately as follows: A three-inch square sample of fabric is placed on a flat surface of metal or glass. A drop of perspiration solution or wash solution is placed on the fabric. A blotter is then placed on the wet fabric and then the electric iron. After five minutes the iron is removed and the blotter is examined. The amount of stain on the blotter has been found proportional to the amount of bleeding in the longer conventional tests. This test is particularly revealing in the case of prints, because it is immediately apparent which colors bleed. The gas-fading test is done in a similar manner, except that the fabric itself is observed, not the blotter. In this test a previously prepared pad is moistened with acid, the blotter is placed on it, the dry fabric on top of this, and, finally, the inevitable electric iron. This test takes only two minutes. These electric-iron tests were not intended to supersede the longer tests with specialized equipment, but they do give a surprisingly accurate picture.

I would like to anticipate the criticism that these tests are open to question, because they do not duplicate actual fabric-exposure conditions. Any laboratory test that is of any use is of use only in that it finds out relatively quickly and simply what will happen in a much longer actual exposure. If it is desired to find out in exact detail what will happen to a shirt in actual service conditions, the best way is to put a lot of shirts in service for a few years and see. This is done, but this is not the function of laboratory testing. I feel, and I do not expect everyone to agree, that the best laboratory test is not the one which most closely approximates actual service conditions, but the one which gives the maximum amount of information most simply and most quickly. It is merely necessary to find a small-scale condition, which, after being carried out carefully by a number of people on a wide variety of fabrics, will

give reproducible results similar to those obtained by more complicated tests and by actual service conditions. This is what was done in the case of these tests.

The main uses for quick tests are envisioned as follows: The first is in finishing plants, where it is highly desirable to be able to tell in a few minutes after a run is finished whether or not the fabric produced is satisfactory. If this is impossible, the choice is to hold up production or to take a chance. Neither is desirable. The finishing plant generally has the specialized testing equipment but does not always want to take the time necessary to use it. Many converters, garment makers, and retail stores have neither the specialized equipment nor the time. Sometimes yesterday's fabrics tend to approach the value of yesterday's newspapers. So, it is essential that it be decided quickly whether or not a fabric is satisfactory for a given use.

It is our feeling that there is a very definite need for the simplified tests already developed and for those yet to come.

IV. FLAMMABILITY OF CLOTHING TEXTILES

GEORGE S BUCK, JR

National Cotton Council of America
Washington, D C

The author discusses how textile-testing methods can become the bases for Federal laws, taking as a particular example the flammability test method of the AATCC. He first gives a history of the development of flammability testing, and then points out how carefully the work on a method must be conducted if it might later be formalized into law. He especially emphasizes that the research must be carried out slowly and surely by broadly representative committees. He concludes that testing methods cannot exactly duplicate actual use conditions, and that standards of procedure are to be preferred over standards of performance.

INTRODUCTION

WHEN President Eisenhower signed the Flammable Fabrics Act on June 30, 1953, a textile-testing standard developed by one of our professional societies became the basis of a Federal law. Most of us feel that that Act is a good law (although it can be improved by the pending amendment), and that it should serve to protect both the public and the industry. We also feel that the part played by the American Association of Textile Chemists and Colorists in developing the flammability test method stands out as a most commendable effort under trying and difficult circumstances. In a sense, this report might well "close the books" on the flammability issue.

It would be shortsighted, however, to overlook the broader implications which can be found in the adoption of a professional testing standard as the basis for a national law. It would also be unworthy of the years of patient work in the AATCC if the lessons learned and the principles of standards development confirmed during the coarse of that work were not to be recorded. AATCC research policy is stronger today because the Association has profited through experience; we hope that all organizations which would develop standards for textiles might also benefit from what AATCC has learned.

HISTORY OF AATCC FLAMMABILITY WORK

No one on the Flammability Committee of AATCC would deny that the group's understanding of the whole flammability subject is much more firmly based now than in 1945, when work on the flammability test method was begun. At that time AATCC undertook the specific problem of providing a test which would distinguish the highly flammable cowboy-suit chaps and similar fabrics from other combustible but nondangerous textiles. A testing device was built in which a standardized flame was applied to the surface of a test-fabric strip clamped in a 45° position, so that, after a one-second impingement, the time of flame travel over a five-inch length was automatically recorded. Enthused by the performance of the tester, the Committee established an arbitrary burning time, which, with a large factor of safety, would place the pile-rayon cowboy-suit material and similar fabrics in the category of "dangerous, not suitable for clothing use".

The Committee did not make the mistake of believing that actual conditions of use, in this case the wearing of a flammable article, could be duplicated exactly in a test method. But the tester embodied certain principles, such as the igniting flame and the inclined rack, which, while entirely artificial, made it possible to separate fabrics into categories based on their ease of ignition and their burning rate. These were the only criteria of flammability used in the early AATCC work.

The pressure put on the Committee to rush its testing method to meet drives toward state and Federal legislation must be blamed for the fact that no thorough study was made of the effect which the arbitrary line between "safe" and "dangerous" fabrics would have. When it was shown that many conventional fabrics would be outlawed by the new testing method, AATCC immediately held up its standard and opened the whole subject for further study. This is important: there was no attempt in AATCC to railroad the standard or to impose the ideas of a part of the industry on other segments.

AATCC, as a matter of fact, made two major changes in its second approach to the flammability test method: first, it established a broader testing program for the standard, involving several different laboratories; secondly, it enlarged its Committee, not only to increase the participation of qualified personnel but, more importantly, to have broader representation of the various textile interests. Later, when the need became apparent, AATCC took the third significant step of directly employing its research organization in Lowell, Massachusetts, on the problem.

AATCC continued to study the flammability problem for six years and to make improvements in both the test method and its interpretation. During this time the AATCC Committee worked in close co-operation with standing and technical committees under the Department of Commerce's commercial standard on flammability. Later, AATCC representatives worked with the National Fire-Protection Association on the same subject. The studies are still continuing, both in committee and at Lowell, and now must total many hundreds of hours of committee work and months of research.

Perhaps the most difficult problem to overcome was the feeling that a fabric, once termed either "safe" or "dangerous" by the establishment of an entirely arbitrary burning limit, was thereafter inher-

ently and necessarily either "safe" or "dangerous" as first categorized. This was in spite of the fact that in most cases no history of the fabric's flammability record was available, and that its characterization was therefore entirely artificial. The same tendency, I believe, will be noted with any performance standard which attempts to create arbitrary levels, especially among those not familiar with the fact that testing standards do not and cannot duplicate or even wholly represent actual service or use conditions.

This problem and others AATCC's Committee recognized and dealt with, and by 1953 the standard had improved sufficiently, in the opinion of most, to warrant its use in a voluntary commercial standard of the US Department of Commerce and its use also as the basis of a Federal law. That the method was not perfect can be deduced from the fact that many textile interests currently are supporting a change in the standard through congressional amendment of the Act. Nevertheless, AATCC has, we sincerely believe, done an outstanding job under unusually difficult circumstances, from which both the industry and the general public will benefit.

THE CONSEQUENCES OF TEXTILE-TESTING METHODS BECOMING BASES FOR LAWS

What are the implications of having a textile-testing standard made the basis of a Federal law? The first interesting fact that becomes apparent is that the AATCC cannot modify or improve its standard without getting the approval of Congress. An AATCC standard for flammability of clothing textiles which differed from that in the Flammable Fabrics Act would be of absolutely no use to anyone. One might even question whether AATCC should continue to have a flammability standard on its books.

The more important implications of this Federal use of an AATCC standard, however, reside in the question of whether we can look for further utilization, or even expropriation, of textile standards by Federal or state acts, state or municipal regulations, or the rules and regulations of various governmental agencies. The evidence indicates we can expect just that. Even before the Federal Flammable Fabrics Act, certain states and cities had moved to utilize the AATCC standard in its early forms. Unfortunately, we find a great reluctance to change such a standard, once adopted, even when later work proves its deficiencies. Certain Federal agencies also have eyed textile standards, particularly those which establish arbitrary performance levels, and some of those standards have already been appropriated by those agencies. I think we can expect more of the same.

If we face the possibility of having our standards taken out of our hands — even of having them used against us by those who don't understand their limitations — then we had better consider carefully what kind of standards we develop. We had better take to heart some of the lessons learned (on confirmed) in he standardization of the flammability test method. Since I feel these are so important and so valuable, I would like to say again that, 1) good standards cannot be developed in haste; 2) standards and test methods cannot duplicate or wholly represent actual service or use conditions; 3) one segment of the industry should not attempt to impose standards on others; 4) standardizing committees should be fully qualified, broadly representative, and provided with facilities for competent review of their work; 5) arbitrary performance levels tend to create artificial values; 6) standards of procedure are much sounder than standards of performance.

There is no doubt in my mind that both AATCC and ASTM have, over the years and because of the experience they have gained, adopted some very similar principles as a guide to their standardizing work. It does concern me, and I know it similarly troubles representatives of other segments of the industry, that all groups which would develop textile standards do not have the same regard for these sound principles.

Specifically, we think it is impossible to develop in so brief a time as a single afternoon a performance standard, even in tentative form, that has any real meaning or value. Performance standards, sometimes called consumer standards, are an especially difficult subject, because artificial values are created by the use of test methods which cannot wholly represent use or service conditions. Performance values thus obtained always overlook the aesthetic values of textiles, the more difficult to measure qualities of appearance, hand and texture, luster and design. Such standards also disregard the part that price plays in performance, and so generally tend to establish a mediocrity level or utility level toward which most products are inevitably down-graded.

We also feel strongly that textile standardizing work should be done in committees both broadly representative and technically qualified. Only by having such committees can serious mistakes be avoided. It would be absurd, for example, to use the AATCC standard for flammability of clothing textiles for articles like bedspreads and drapery, where the test's ignition and intensity factors and fabrics positioning would have no relationship to the flammability of such articles nor its limits, any meaning. The use of the clothing flammability test for awning fabrics would be simply ridiculous; there isn't an awning fabric made that would even ignite in the tester.

I don't mean to imply that the principles I have been discussing became first established in the development of the AATCC flammability standard. I feel certain that they have long been observed by qualified standardizing groups. The development of a flammability test served to confirm these principles in a striking manner, however, largely because of the inherent relationship between that test method and performance values. If the experience gained with the standard can contribute to a sounder basis in other standards developments, its indirect benefits may exceed even its value in controlling highly flammable textiles. This may be especially true at a time when there seems to be a trend toward applications of textile standards by agencies which may make their provisions mandatory.

The textile industry cannot afford to disregard any attempts to develop standards for its products or its methods. It is not wise to support only those efforts which are sound and potentially useful and to shrug off those which appear to serve no good purpose or to be either inadequate or incorrect. Experience with the flammability methods proves that there is no certainty where, when, and by whom a standard may be used.

It is fortunate for the textile industry and the general public alike that a professional association of the caliber of AATCC was available to guide the development of the flammability standard. The broad representation achieved through that organization, its technically qualified committees and careful review functions, and its research facilities all contribute to a standard that promises to be reasonable and practical. Although a representative of only one segment of the textile industry, I think I speak for most when I say that the entire industry appreciates and is grateful for the thorough and careful procedures of standards development in AATCC.

DISCUSSION

Question: Is there a provision for increasing the ignition time for heavy fabrics?

Answer: As no provision has been made for extending flammability testing beyond the field of clothing textiles, no consideration has been given to increasing the duration of the impingement of flame in the flame tester beyond that necessary for testing clothing fabrics.

Book Reviews

PHYSICAL CHEMISTRY——— First English Edition

A J Rutgers, University of Ghent; Interscience Publishers, Inc, New York, N Y; 1954; xviii + 804 pp; 182 figures, 87 tables; 15 x 23 cm

This book is well characterized by Dr P Debye in the Foreword when he says "This new book by Rutgers covers its subject very completely. Some parts are clearly Physical Chemistry in the classical sense of the word, others . . . Chemical Physics."

The treatment is rigorously mathematical throughout, but the text is so well written that it is readily understandable by anyone at all familiar with the mathematics required by the subject under discussion. The wide gaps in development so often found in advanced books, and so discouraging to the reader who wants to follow the author's argument, are seldom found in this book. It might also be said that, although the author has never hesitated to use mathematics, he has not used complicated forms where a simpler development is equally rigorous.

It is an excellent book for the chemist who is not afraid of mathematics.

In addition to the discussion of gases, liquids, solids, solutions, etc, found in any book on physical chemistry, there are sections on quantum theory, classical theoretical mechanics, wave mechanics, statistical mechanics and the atomic nucleus.

An appendix by Turner Alfrey, Jr covers in 26 pages the Physical Chemistry of High Polymers. The section is "more complete in its coverage of the *methods* than of the *content* of high polymer physical chemistry."—WGC

ORGANIC PEROXIDES——— Their Chemistry, Decomposition, and Role in Polymerization

A V Tobolsky, Princeton University, Princeton, N J and R B Mesrobian, Polytechnic Institute of Brooklyn, Brooklyn, N Y; Interscience Publishers, Inc, New York, N Y; 1954; x + 197 pp; 15.5 x 23.5 cm; $5.75

An individual who studied organic chemistry many years ago, and who may still carry an impression that organic peroxides are vaguely defined explosive materials, may be surprised to learn that such substances are now of sufficient importance that a 200-page book about them can be written. Organic peroxides are not any less explosive or dangerous to work with than they used to be; this book describes (pages 177-180) peroxides that explode upon touching or removal from a freezing mixture. The existence of di-tertiary-butyl peroxide, a substance that can be distilled at atmospheric pressure without decomposition, does not make the field as a whole any safer to work in. The chief reason for the increased study of organic peroxides in recent years in spite of the inherent danger of carrying out laboratory work with them is mainly due to their ability to initiate vinyl-type polyaddition. Section C, the last of the three sections into which this book is divided, is devoted to this topic. Section A is concerned with the preparation, properties, and structure of organic peroxides, while section B takes up the decomposition of organic peroxides. Section B should be of interest mainly to those chemists interested in the course and mechanism of organic reactions. This excellent book is recommended to any reader who has a general interest in organic chemistry, and especially to those who must deal with polymeric materials including synthetic rubbers and fiber-forming polymers.

The reviewer has found this book to be relatively free of trivial errors. However, he has found some words which he considers misused. On page 1, an organic peroxide is regarded as a derivative of hydrogen peroxide obtained by replacing one or both of the hydrogen atoms by "organic radicals." Most organic chemists would prefer the use of "organic groups." The authors usually use the word "radical" in quite a different sense. On page 7, the two "forms" of the hydroperoxide of 1,2-dimethylcyclohexene are more correctly described as two "isomers." A more serious error is the incorrect use of the word "catalyst." On page 73 and elsewhere, benzoyl peroxide is described as a widely used "catalyst" for polymerization. Since this "catalyst" is not recoverable after the polymerization has been completed, it is better to call it an "initiator." On page 122 the incorrect name "cyclohexene hydroperoxide" appears. It is impossible to tell from the context what hydroperoxide the authors mean to designated by this name. If it is 2-cyclohexene-1-yl hydroperoxide that is meant, it is difficult to see how this can form the cyclohexanol stated by the authors (without reference) to be the product of its decomposition, as cyclohexanol contains two hydrogen atoms more than the hydroperoxide named above. If this reaction is really a disproportionation instead of a decomposition, then its use as an argument against the mechanism of base-catalyzed decomposition of secondary hydroperoxides postulated by Kornblum and De Lamare is invalid.

This is only one place in this excellent book where the treatment of ionic mechanisms suffer at the hands of free radical counterparts. The authors list (pages 58 thru 63) several criteria by which it is believed possible to distinguish a reaction proceeding by a free radical course from one taking place by an ionic course. The most incontrovertible way of establishing whether ions or radicals are formed by the dissociation of molecule A:B in a solvent is by a direct physical measurement of conductance or magnetic susceptibility. The sole reference given by the authors (on page 58) for the use of magnetic measurements to detect the presence of free radicals is to a paper in which steric effects were neglected in the discussion.

The authors do not list color as a criterion for the presence of free radicals but imply on pages 58, 61, and elsewhere that colored solutions of a certain substance may indicate dissociation into free radicals. It is becoming increasingly apparent to those who study the literature of the chemistry of dyes, that steric effects play an important role in the relation of radiation absorption to chemical structure. Most chemists working in the textile field will agree that the phenomena associated with color are complicated and not necessarily attributable free radicals. The complex relation between structure, steric effects, radiation absorption and dissociation into radicals will need the application of sound unbiased thinking before it is more fully understood. Since it has not been possible to make an incontrovertible physical test for free radicals formed on dissociation, the diagnostic tests for the detection of radical decomposition of peroxides may be used and are listed on page 59. The reviewer notes that a similar list of diagnostic tests for the detection of ionic decomposition of peroxides is not presented. The diagnostic tests for the detection of radical decomposition are far from conclusive as stated by the authors. When the decomposing compound can initiate polymerization of a vinyl monomer, the presence of radicals may be suspected. However, this is not conclusive proof of their presence since certain ions can also initiate polyaddition. But on page 98 and elsewhere, vinyl polymerization initiation is routinely regarded as an indication of the presence of radicals.

Some of the radicals conjured up by some theorists in the field of polymerization are ghastly enough to horrify an organic chemist. On page 100, for example, the reader is informed that D' is the radical derived from dextrose. No mention of this radical is made by Pigman and Goepp (Chemistry of the Carbohydrates, Academic Press, New York, 1948) on page 338 where the Haber-Weiss suggestion is mentioned. It seems curious

that chemists working in the difficult and complex field of carbohydrate chemistry have never felt the necessity of suggesting the existence of a radical which chemists working in the field of polymerization do not hesitate to postulate even though they cannot name it correctly (the correct name for dextrose is D-glucose).

The reviewer feels that those who will attempt to formulate mechanisms of peroxide reactions and polymerization in terms of ions have the whole field of contemporary organic chemistry to draw on. Perhaps the phenonium ions of Cram, the termolecular displacements of Swain, and the steric conceptions of Brown can contribute something to the understanding of reactions so complicated that they can now be formulated with radicals which only appear in books of this type. As chemists who study the reactions of peroxides become more conversant with contemporary organic chemistry, it is to be hoped that some of the improbable radicals mentioned in this book will disappear from the chemical literature. Then the chemistry of polymerization will have the same clear logical basis currently enjoyed by much of the rest of organic chemistry.—AS

IMIDAZOLE AND ITS DERIVATIVES——Part I (Volume 6 of "The Chemistry of Heterocyclic Compounds")

Klaus Hofmann; Interscience Publishers, Inc, New York, N Y; 1953; xvii + 447 pp; $12.25 (subscription), $13.50 (single copy)

This monograph gives a thorough presentation of the chemistry of the imidazoles, the imidazolines, the imidazolidines, and the benzimidazoles and their derivatives. Applications of biochemical importance are discussed.

The book is of importance to the chemist in the textile field insofar as he may be required to do synthetic or analytical work involving compounds of this particular class. Thus this book should find its place as a reference volume in the technical libraries of manufacturing concerns and schools rather than in the private libraries of most textile chemists.—JHR

ORGANIC SYNTHESES——Volume 34

William S Johnson, editor-in-chief; John Wiley and Sons, Inc, New York, N Y; 1954; vi + 121 pp; 14.5 x 23 cm; $3.50

The thirty-fourth annual volume of "Organic Syntheses" maintains the high standards set by the previous volumes in this series, which is an annual publication of satisfactory methods for the preparation of organic chemicals. Thirty-four preparations are given in this volume.

Among those directions of possible interest to a textile chemist are the following: Directions for diazotization of p-aminoacetophenone (dyes), directions for the preparation of azelanitrile (polymers), a method of preparation of cetylmalonic ester (surfactants), a procedure for the purification of phenanthrene (an isomer of the symbol of the AATCC) and its hydrogenation, the preparation of p,p-dinitrobibenzyl by air oxidation of p-nitrotoluene (dyes), directions for preparing 1,4-dinitrobutane (linear polymers), hemimellitene (1,2,3-trimethylbenzene, dye intermediate), 3-methyl-1,5-pentanediol (linear polyesters), phenanthrenequinone (dyes), N-phenylpiperidine (dyes), o-phthalaldehyde (dyes), *B*-styrenesulfonyl chloride (polymers and polyelectrolytes), tetralin hydroperoxide (polymerization initiator), and o-xylylene dibromide (lachrymator).—AS

SYNTHETISCHE WASCH-UND REINIGUNGSMITTEL

Helmut Stüpel, Konradin-Verlag, Robert Kohlhammer GmbH, Stuttgart, Germany; DM 68

This valuable reference work is designed for use by anyone directly concerned with surfactants. While not specifically aimed at the textile chemist, the summary of physico-chemical properties as correlated with structure can lead to a better understanding of surfactant application to the textile industry.

Dr Stuepel has done an excellent job in selecting the really useful recently published data for most effectively "building" detergents for optimum effectiveness. His book is well organized, leading from structure as correlated to physico-chemical properties, through methods of synthesis and manufacture, to practical applications. Included are methods for identification and analysis, a table of widely used surfactants (by name, active content and type), methods for production, and analyses of a variety of currently used detergents.

An outstanding characteristic of the book is Dr Stupel's choice of literature references comprised of the outstanding recent world-wide contributions. The book is concise and clear in wordage, and well indexed for optimum ease of usage.—JCH

CORROSION——A Series of Papers Reprinted from "Research"——Volume 5, 1952

Buttersworth Publications, London, England; 1953; iii + 57 pp; $1.75

This short collection of papers ought to prove of great value to those individuals who are concerned with the problem of corrosion. Certain topics, such as "Metallic Corrosion," "Prevention of Corrosion by Metallic Coatings," "The Protective Action of Paint," and "Prevention of Corrosion by Metallic Coatings," "The Protective Action of Paints," and "Prevention of Corrosion by Means of Inhibitors," are a well-written exposition of recent advances in these fields of corrosion control.—VL

MICRO AND SEMIMICRO METHODS——(Volume VI of "Techniques of Organic Chemistry")

Nicholas Cheronis; Interscience Publishers, Inc, New York, N Y; $12.00

This is the sixth in a series of books covering many aspects of the broad field of organic techniques including physical methods, reactions, rates and mechanisms, unit operations, spectroscopy, etc. This particular volume is specifically devoted to the micro and semimicro techniques of preparation and analytical organic chemistry. Micro and semimicro analytical procedures involve quantities up to 10 mg and from 12-25 mg respectively, and for preparative procedures the respective limits are measured to 10-25 mg and 100-2000 mg.

The book is divided into three parts. In the first part there is presented a detailed description of methods and apparatus for carrying out such basic operations as crystallization, distillation, sublimation, extraction, and measurement of weight and volume on a micro and semimicro scale. Included also is a very useful chapter on methods for measuring physical constants. Details of construction and operation of each important piece of apparatus is made clear in numerous sketches and photographs and an actual review of the procedure is ordinarily included.

The second part of the book is concerned with important preparative procedures including reduction by various agents, oxidation, halogenation, acylation, esterification, hydrolysis, nitration, sulfonation, amination, diazotization. A particularly interesting chapter is included on microsynthesis with tracer elements.

The third part of this book has much in common with standard books on qualitative organic. It includes procedures for the standard functional group tests together with a discussion of the apparatus and temperatures of each test as well as detailed procedures for the preparation of common derivatives. Tables of derivatives and their physical constants are considered as being outside the scope of this book. Little is included in the quantitative estimation of functional groups on a micro or semimicro scale and this comes

as somewhat of a disappointment considering the completeness with which other aspects of the subject of microtechniques are treated. An increase in the micro quantitative procedures, even at the expense of the more familiar qualitative procedures if necessary would increase the usefulness of the book.

This reference is primarily for the laboratory worker and represents a valuable contribution to his library. It promises a ready reference the most useful for micro and semimicro procedures. It is complete and detailed in this respect and through its more than 1700 references, furthermore provides the laboratory man with a direct key to the original literature in the micro and semimicro field.—GRG

VAPOR PRESSURE OF ORGANIC COMPOUNDS

T Earl Jordan, Publicker Industries, Inc, Philadelphia, Pa; Interscience Publishers, Inc, New York, N Y; 1954; ix + 266 pp, 166 tables; 21 x 28 cm; $14.50

This is a book of numerical data. There is no text. A short introduction explains the method of use, then follow the data on some 1550 organic compounds.

The data are arranged in ten chapters—hydrocarbons; halogen compounds; alcohols; aldehydes, etc; acids; nitrogen compounds; phenols; and two chapters on metal organic compounds.

Each chapter is divided into four parts:

1) A master table giving equations for vapor pressure vs temperature, boiling point, and a number used as a reference to the other parts.
2) Individual tables for some compounds at a number of temperatures.
3) References.
4) Plates, plotting logarithms of pressure vs temperature.

The extensive coverage of vapor pressure data makes the book invaluable to anyone who has need of vp data of the less common organic compounds. Certainly nowhere else is such a complete collection of vapor pressure data available.

The index is apt to be confusing, since each compound is listed only once under "the name most commonly employed in the laboratory." Since not every laboratory commonly uses the same name for a compound, this may lead to the false conclusion that no data is available on a compound if the name chosen by the author is not suspected. For example: ethyl alcohol is listed only under "ethanol," chloroform under "trichloromethane," and acetone by that name.

Once the compound is located, however, the arrangement of data is clear and convenient.—WGC

CELLULOSE AND CELLULOSE DERIVATIVES (High Polymers Series—Volume V)———2nd Edition, Part I

Edited by Emil Ott and Harold Spurlin, coeditors, and Mildred W Grafflin, assistant editor; Interscience Publishers, Inc, New York, N Y; $12.00

A revised and augmented edition of Volume V on Cellulose, which constituted a part of a series of references on high polymers, this second edition is published in three parts.

Part I is concerned primarily with the occurrence, chemical nature, structure and properties of cellulose, of cellulose derivatives and of cellulose fibers. Subjects including the preparation, bleaching and purification of cellulose from natural sources, the properties and treatment of pulp for paper, and the preparation and properties of cellulose derivatives are reserved for Part II while Part III is concerned primarily with the physical chemistry and mechanical properties of cellulose and its derivatives.

The field covered by Part I is very broad and the subject matter is comprised of a number of separate contributions from many specialists, yet through able editorship a well integrated picture is presented. The chemist will find the section on the chemical nature of cellulose and its derivatives well done, and men in the textile field will be especially interested in those portions on degradation by various agents. Data of a physical chemical nature are supplemented where possible by mechanism presented in the light of modern theory.

The portion of the book devoted to cellulose fibers is quite extensive and includes such subjects as microscopic and submicroscopic structure, crystallinity and molecular orientation, sorption, and swelling. Through the inclusion of the above material, the volume becomes a useful reference book for those engaged in the field of textile chemistry and for investigators in pure cellulose research.—GRG

ELEMENTARY INTRODUCTION TO MOLECULAR SPECTRA

Borge Bak; Interscience Publishers, Inc, New York, N Y; 123 pp

This relatively small book deals with a topic on which very little previously has been written, ie, molecular spectroscopy. The author presents a comprehensive theoretical approach to the topic with experimental applications cited throughout. The first chapter is an introductory one on general spectrographic theory. The succeeding chapter deals with the derivation of the equations utilized in molecular spectroscopy. A knowledge of advanced calculus and quantum mechanics would be advantageous to a complete understanding of the material covered.

The balance of the book discusses the specific application of these theories to the molecular spectra obtainable in the microwave, infrared, and visible-ultraviolet regions. The available facilities and the limitations of spectrographic analysis in each of these regions is appraised. Although the author states that an understanding of this portion of the book is not dependent upon the reader having knowledge of advanced mathematics, a strong mathematical background would enable the reader to follow these sections much more confidently.—LCB

PLASTICS ENGINEERING HANDBOOK

The Society of the Plastics Industry, Inc; Reinhold Publishing Corp, New York; 1954; 813 pages; $15.00

The second edition of the Plastics Engineering Handbook is divided into five sections: Materials and Processes, Design, Finishing and Assembly, Testing, and SPI Standards.

These subjects are discussed in detail to provide the majority associated with the plastics industry an up-to-date plastics engineering guide. Although coverage of some items, including halogenated ethylene polymers, is conspicuous by its absence the promise of time-to-time revisions and additions to include new materials, methods and applications is most reassuring.

Many of the eleven chapters in the Materials and Process Section describe the preparation of materials for molding and the application of the appropriate molding methods thereto. Much of the information on reinforced plastics and plastic tooling is new.

Specific information relating to design of molded items, design of molds, and various type of inserts is given in the four chapters under Design.

The three chapters in the Finishing and Assembling Section deal with basic principles of machinery, finishing and decorating various types of plastics, how to join plastics to plastics and other materials, and gluing parts together for assembly purposes.

The section on Testing is an expansion of the previous effort to arrive at some useful classification of types of methods and equipment for testing plastic articles.

The last section is devoted to a brief discussion of the commercial standards, the result of the combined efforts of government and industry to establish methods of testing, rating, certification, and labeling of commodities to provide uniform bases for fair competition.—RWE

ABSTRACTS

Effect of Heat on Fibers

S P Gundavda, *Brit Rayon & Silk J* 31, 66, 68, August, 1954.

Heat is applied to textiles in various stages of manufacture, in the pressing and ironing of garments, and repeatedly during usage. The effect of heat is an important practical consideration.

Cotton yellows after heating at 248°F for 5 hours, decomposes at 302°F, does not char. Viscose rayon loses strength above 300°F, decomposes at 350-400°F, chars at 325°F. Silk rapidly disintegrates above 305°F, while wool becomes harsh at 212°F, decomposes at 266°F, scorches at 400°F, and chars at 572°F. Fortisan loses strength above 266°F. The synthetic thermoplastic fibers stick at about 455°F and melt at about 480°F, while acetate rayon sticks at 392°F and melts at 446°F. When heated for 5 hours at 300°F in dry air as an undyed fabric, silk turns brown, wool turns yellow, nylon, light yellow, and viscose and acetate rayon very light yellow; cotton and Terylene are not appreciably affected. Orlon and Acrilan stick at 455°F; X-51 sticks at 560°F, yellows at 392°F, and blackens at 500°F. Dynel shrinks at 250°F if it is not heat set at a higher temperature. Vinyon becomes sticky and shrinks at 150°F, softens at about 170°F, and melts at 260°F. Saran softens at 240-280°F. Polyethylene shrinks at 165°F, melts at 235°F, and softens at 225°F.

The flame test is a quick method of identifying textile fibers. Cotton burns rapidly, leaves gray ash and no bead, smells of scorched paper. Wool burns with odor of burning feathers, leaves brittle shiny bead. Viscose rayon burns with little ash, does not melt. Acetate rayon melts, forms hard black bead. Nylon and Terylene melt before burning; Orlon and Acrilan melt and burn leaving a hard black bead, but they do not ignite easily, and present no problem of "pinholes" which are caused by hot ashes and the like. The vinyl fibers do not support combustion, due to their high chlorine content. Polyvinylidene chloride and polyvinyl chloride fibers (chlorine content 73 and 57 percent respectively) shrink and fuse into globules in a direct flame. They will not themselves propagate flame and do not drip. Vinyon N and Dynel fabrics (chlorine content 34 percent) are fire resistant.

The author discusses the heat setting of Orlon, nylon, and Terylene. He also mentions possible changes in the Terylene polymer that may take place during melt spinning if the high temperature is prolonged. He gives figures of the loss in tensile strength of various fibers when heated for prolonged periods.—WHC

New Developments in Pigment Printing of Textile Fibers and Novelty Screen Effects

F G LaPiana, *Book of Papers, 4th Canadian Textile Seminar*, p 46-50.

Until quite recently, the binder used in printing pigment colors was albumen. The author describes this process, but states that it had the disadvantages of poor fastness to rubbing of the printed colors and excessive foaming in the color box. Casein and glue have also been used as binders.

The discovery of the solvent-soluble synthetic resins of the aminoformaldehyde and modified alkyd types, and their use in emulsion systems of the water-in-oil type, opened the way to successful commercial application of pigment colors to textiles on a large scale.

Great advances have been made in the development of new pigment colors with brilliance, high tinctorial strength, and fastness, including the phthalocyanines and various vat and azoic pigments.

The pigmented printing compositions employed are usually in the form of water-in-oil or oil-in-water emulsions. The technique of making these pastes is described by the author in much detail.

The process of screen printing is a modern adaptation of the old method of stencil printing, originally adapted by the Chinese for applying design to cloth. The modern screen-printing process is described, and a number of useful suggestions are given for overcoming various problems that are apt to arise.

In recent years large yardages of cotton and synthetic fabrics have been put out, decorated with novel printing techniques executed on screens and by roller printing. These include successful printing of metallic powders (gold and silver), glazed chintz effects, puckered or crinkled designs, and embossed and sculptured prints embodying pigments and metallics. These various techniques are described by the author.

At first it would appear that metallic powders could be treated like pigment colors and printed in a like manner, using the same water-in-oil or oil-in-water emulsion. However, these types of vehicle do not yield satisfactory results. The synthetic latices, especially those of the vinyl, styrene, and acrylic polymers in properly balanced, plasticized and thickened mixtures, have been found to be the most satisfactory as vehicles for printing metallic powders, both on the roller machine and on the screen table.

In conclusion, the author states that research is necessary for the development of new pigments and better binders, and in particular, an all-round satisfactory aqueous system of printing, completely free of volatile solvents.

Eight references to the literature are cited.—WHC

Fugitive Tinting

W Meitner and J E Taylor, *Textile Recorder* 72, 86-7, August, 1954.

The purpose of fugitive tinting is to provide a color code that will enable the physical and chemical properties of individual textile fibers and yarns to be identified rapidly. To be satisfactory the tints should possess certain properties. Thus, they should be readily removable by ordinary scouring treatments; they should not migrate during processing; and if applied to one fiber in a blend, they should not stain other fibers. Tints should also be capable of being subjected to all the normal textile processes (e g, heat treatments) without losing their fugitiveness.

The authors classify the fugitive tints at present available into three main groups: (1) finely divided pigments insoluble under all conditions and having no affinity for any fiber (these must be mechanically removed during scouring); (2) normal water-soluble dyes of all types which can be used on fibers for which they have little or no affinity; (3) high-polymer colored complexes having a certain amount of coherence on the surface of the fiber but completely unable to penetrate to the interior.

Of these three groups, the pigments have poor color yield and tend to "dust off," while there is difficulty in finding water-soluble dyes that can be completely removed in scouring. The possibilities of the high-polymer dye complexes have not yet been fully explored. Some of these work by combining with the dye to form a compound that has no affinity for the fiber.

The ideal tint, according to the authors, is one that can be applied, like a pigment, as a suspension, and that will still be soluble in the ordinary scouring bath. For this purpose casein was selected, being soluble in water at pH or above and at pH 3.5 or below, while it is insoluble at pH 4-6. Casein complexes were formed with four direct dyes, which were found to have no affinity for viscose, wool, acetate, and nylon, and could easily be removed by scouring, even after prolonged steaming.

Further work is in prospect on these complexes, and full-scale trials have yet to be carried out.—WHC

The Challenge of Synthetic Fibers

H W Partridge, *Textile Mfr* 80, 64-5, 73-4, February, 1954.

The author defines "synthetic fibers" as "fibers or filaments produced from polymers built up from chemical elements or compounds, in contrast to those made by man from naturally occurring fiber-forming polymers."

He recalls that less than 100 years ago all dyes were of natural origin, but during the following 50 years they were all, with few exceptions, replaced by synthetic dyes. He asks, will the natural fibers ultimately go the same way as the natural dyes?

Among the advantages possessed by the synthetic fibers are superior strength, elasticity, resistance to abrasion, mildew, fire and insects, and uniformity of composition. There is also an increasing possibility of producing "tailored" fibers specifically designed for particular end-use requirements.

The author suggests that the natural fibers must "fight back" if they are to retain their importance in the textile world by exploiting their advantages and correcting their disadvantages. He mentions in this connection the progress made in rendering wool shrink-proof and immune to moth attacks, and in rot-proofing cotton.

The author believes that the textile industry may well meet the challenge of the synthetics by accepting them for what they are worth and by incorporating them in blends with the natural fibers to produce fabrics superior to those that could be manufactured from either class of fiber alone.

He states that it is not sufficient for the designer and manufacturer of fabrics to be familiar with the mechanical properties of the fibers; they must consult with the dyer to ascertain the blends of fibers which can, or cannot, be successfully processed together (e g, to obtain satisfactory solid shades).

Among the disadvantages of the synthetic fibers which are cited are a tendency to accumulate static charges and the low softening point of some of the fibers.

The author finally discusses the dyeing problems of some of the more important synthetics (nylon, Terylene, Orlon 42, and Dynel), and shows how these problems have been overcome, e g, by the use of high-temperature dyeing and "carriers." —WHC

Nonionic Surfactants: Their Chemistry and Textile Uses

C F Jelinek and R L Mayhew, *Textile Research J* 24, 761-78, August, 1954.

During the past decade, one of the most versatile and interesting classes of products which has attained widespread industrial usage is that of nonionic surface-active agents or surfactants. There are now many types available under numerous trade names.

The largest quantity of these nonionic textile chemicals is prepared by the reaction of ethylene oxide with materials containing reactive hydrogen, such as alkylphenols, alcohols, acids, mercaptans, amides, and amines. The chemistry of these various types of nonionics is described by the authors. Other types are also referred to briefly.

The authors furnish much information on the general nature of surfactants and their performance characteristics as emulsifiers, as wetting agents, and as detergents. They list some of the more important applications of the nonionics in textile operations, including fiber manufacture, scouring, carbonizing, desizing, bleaching, dyeing, printing, and finishing. They mention the relative efficiency of the different types in removing soil from wool, and in lime-soap dispersion.

In summarizing the advantages of nonionics, the authors specify their liquid form and lack of substantivity, permitting quick rinsing; their compatibility with a wide variety of materials; good wetting, emulsifying, detergent, and water-softening properties; stability to acid, alkaline, and oxidizing agents; and the possibility of developing "tailor-made" nonionics with specific properties.

Among the limitations of nonionics, they mention their low solubility in hot aqueous solutions; their lack of softening power; and excessive foaming in some uses and insufficient foaming in others.

They refer briefly to the major developments in prospect for improving the nonionics, and predict that during the next five years they will be used to a proprotionately greater extent in the textile industry than they are today. Twenty-seven references to the literature are cited.—WHC

The Versatility of Hydrogen Peroxide for Wool Dyers and Finishers

P H Margulies, *Textile Ind* 118, 111-12, May, 1954.

For bleaching wool, the use of peroxygen compounds is well-known, but these compounds are also useful in several other operations in the processing of wool, including carroting, fulling, shrink-proofing, and dyeing.

Carroting is a special treatment used to impart improved felting properties to animal fibers, particularly hair fibers used in making hat felts. It is essentially an oxidation process. When applied to the wool fiber the carroting solution, containing acids and an oxidizing agent such as hydrogen peroxide, causes a limited breakdown of the cystine bridges and enhances the elastic and plastic properties of the fiber.

Fulling is a mechanical process that enables wool fibers to interlock and form a felt. The process is conducted at slightly above room temperature in a soap solution containing a small amount of free alkali, which promotes swelling of the fibers. The author states that acid solutions of hydrogen peroxide will also promote felting of wool, and are used in fulling poorer grades, and fabrics that have lost some of their original fulling ability as a result of previous treatments. A solution containing 4 g sulfuric acid and 6-7 g hydrogen peroxide 35% per liter, plus a suitable metallic catalyst, is recommended. The fabric is treated with this solution for several hours at room temperature and is then fulled as usual.

In the chlorination of wool for shrink-proofing, the chlorine uptake of the wool can be reduced by pretreating the material with a hydrogen peroxide solution containing a small amount of alkali. Wool so treated takes up only about one-half as much chlorine as wool not treated with peroxide. The author states that in the "Schollerizing" shrink-proofing process the chlorination treatment is carried out under milder conditions if the goods are to be bleached later with peroxide, since a certain amount of shrink-proofing results from the peroxide treatment alone.

Hydrogen peroxide is an excellent agent for the oxidation of vat dyes on wool.—WHC

Scouring Raw Wool with Nonionic Detergents and Salt

H Zimmerman, *Book of Papers, 4th Canadian Textile Seminar*, p 51-5.

The essential consideration in obtaining properly scoured wool is that no chemical damage should take place, so that the wool will retain its unique and prized properties. So-called over-scoured wool causes difficulties in all the subsequent operations of drying, carding, backwashing, intergilling, combing, drawing, spinning, dyeing, and finishing.

Since earliest times, wool has been scoured with alkali. In later years a combination of soap and alkali has been used. While this is still the most universally used method for scouring wool, the soap is rapidly being replaced by synthetic detergents.

The past few years have witnessed a complete change in the situation. Since the introduction of special nonionics for scouring wool, scouring with even the cheapest of soaps is now more expensive, according to the author, than scouring with synthetics.

The newest method, and one that has

evoked considerable interest, consists of the complete replacement of soap and soda ash by nonionics and salt. This scour has resulted not only in marked economy but in a fiber with no alkali damage.

Of the nonionics, polyoxyethylated fatty alcohols and alkyl phenoxy polyoxyethylene etholans have found acceptance as raw wool detergents, and the recently specially prepared polyoxyethylated branched-chain alcohols have proved to be the most economical and effective for this purpose.

According to the author, results using anionic detergents such as alkylarylsulfonates and fatty alcohol sulfates for scouring raw wool have not been satisfactory because the detergent exhausts on the wool and it is difficult to obtain consistently uniform results.

In spite of statements to the contrary, the scouring of raw wool is not simple. It is one of the most complex and intricate of all scouring and detergency problems. The many theories advanced with reference to emulsification, wetting and detergency are of little help in formulating a system for the scouring of raw wool. Artificially soiled fabrics are of no help whatsoever for testing a raw wool detergent.

The author describes the natural impurities occurring in raw wool (grease, suint, etc). Wide variations in the amount of these impurities are found in the different grades of wool. He lists 14 advantages of the scouring method using nonionics and salt, as compared with soap and alkali, and gives a general formula for the content of the scouring solution. —WHC

Control of Fabric Degradation in the Application of Thermosetting Resins

H C Borghetty, *Book of Papers, 4th Canadian Textile Seminar*, p 54-7.

Thermosetting resins are used in large quantities on rayon fabrics and rayon/acetate in order to give them high wet strength and good abrasion resistance during the wash operation in conjunction with shrinkage control and crushproofing.

A few years ago in the United States there was considerable controversy on the so-called degrading properties of the fiber by the use of resins, but it later became apparent that the difficulties were caused by excessive amounts of resin. The writer also calls attention to the fact that the losses attributed to thermosetting resins are transitory, and that the original properties can be readily re-acquired by removal of the resin. This proves definitely that the change in physical properties is not intrinsic degradation of the fiber.

The writer outlines ideal conditions to reduce the undesirable properties to a minimum and discusses the various factors involved in the application of thermosetting resins.

Synthetic resins of the urea- and melamine-formaldehyde types have been successfully applied to fabrics of rayon and acetate for almost 20 years; similar thermosetting resins of the reactant type have recently attained large volume usage on fabrics of cotton for glazing, embossing, and for stabilized wrinkle-resistant garments. The improvement in quality of all these fabrics has more than offset the simultaneous decrease noted in some properties, such as tear strength, abrasion resistance, and feel of the fabric.

Excessive decrease in abrasion resistance and tear strength that is occasionally encountered is attributed by the writer to overloading and poor distribution of the resin, and improper use of catalysts. He presents tables showing the effect of various creaseproofing compounds on the mechanical properties of rayon and cotton fabrics, and the performance characteristics of wrinkleproofing and stabilizing agents for viscose rayon. He also discusses the theory of crush resistance, and states that the theories concerning the actual physical and chemical mechanisms of crease resistance and shrinkage control have not been established, and industry is still utilizing products developed many years ago by the TBL patentees.

Finally, the writer stresses the importance of washing all fabrics after creaseproofing. This wash removes the excess catalyst and the uncured resin, reduces the surface resin, eliminates flaking and dusting, and insures against the development of unpleasant amine odors.—WHC

Some Interesting Aspects of the Rotproofing of Cotton Fabrics

B C M Dorset, *Textile Mfr* 80; 421-5, 474-7, August and September, 1954.

The interest in rotproofing processes for articles such as sandbags, tent fabrics, tarpaulins, awnings, and similar articles which was aroused by military requirements during the last war has increased greatly in the intervening years, and considerable research is now being carried out with the object of elucidating the way in which bacteria, enzymes, and fungi bring about the deterioration of cotton materials, and also for discovering protective treatments. Several important papers on this subject are reviewed by the author.

The result of research during the past ten to fifteen years has indicated that cotton materials may be protected against attack by microorganisms by a limited number of different methods which include:

1) Filling up the cotton fibers with a substance such as a synthetic resin, so as to prevent the entry into or at least hinder the normal functioning of the microorganisms within them.

2) Impregnating the fibers with a substance that poisons the microorganisms.

3) Chemically modifying the cellulose of which the fibers are composed, so that they may be chemically resistant to attack.

Each of these protective treatments has its characteristic advantages and disadvantages, and these must be considered in relation to any particular use to which the cotton material is to be put.

The author describes some of the fungicides that have been proposed for the protection of the fiber. He gives the chemical structure of several different organic compounds recommended for this purpose, and comments that the most satisfactory and efficient fungicides are based mainly on phenolic, copper, mercury, and various metal organic compounds (eg, copper naphthenate, copper-8-quinolinolate, phenyl-mercuri-naphthenate, and the "Puratized" process products).

The author describes three different methods for chemically modifying cellulose to make it immune to fungi: 1) treatment with formaldehyde; 2) esterification with acetic acid or phosphoric acid; and 3) cyanoethylation. All of these methods, when suitably applied, are capable of increasing the resistance of cotton fabrics to microbiological attack, he says. The phosphoric acid treatment is already being used also for flameproofing cotton.—WHC

Scientific Success Story of Polyethylene Terephthalate

E F Izard, *Chem Eng News* 32, 3724-8, Sept 20, 1954.

The author briefly reviews the research work of W H Carothers, which resulted in the synthesis of "high-molecular-weight linear aliphatic polyamides", now known as nylon.

The researches of the Calico Printers Association in England, later supported by Imperial Chemical Industries, eventually led to commercial development of fibers made from polyethylene terephthalate, marketed under the name of Terylene polyester fiber.

An independent investigation by the Du Pont Company resulted in synthesis of a high-melting, strong substance which is also polyethylene terephthalate. Three products are now being made from it: Mylar polyester film, Dacron polyester fiber, and a polyester base for photographic film (now only in pilot-plant production).

The author reviews the difficult research work involved in this development, and explains why the polyethylene terephthalate was finally chosen as the most suitable material for film and fiber production.—WHC

• NEWS OF THE TRADE •

• Witco Acquires New Interests

Witco Chemical Company, 260 Madison Ave, New York, N Y has taken over substantial new interests with the acquisition of a one-half interest in Ultra Chemical Works, Inc, Paterson, N J, and the acquisition of the Chemical Division of The Emulsol Corporation, Chicago, Ill. Witco has organized Emulsol Chemical Corporation to manufacture the chemicals which have been produced in these facilities for many years.

Ultra Chemical Works is a large producer of synthetic detergents, waxes and chemical specialties with their main plaint in Paterson, N J, and auxiliary plants in Joliet, Ill, and Los Angeles, Calif. The officers and management of Ultra Chemical Works will continue as at present.

Key personnel of the Emulsol Chemical Corporation have been prominently identified, during the past thirty years, with many major developments in surface-active agents for wetting, emulsifying, dispersing, foaming, sanitizing, bodying, deflocculating, defoaming, and cleansing for use in many processing industries. Continuing as president of Emulsol is Benjamin R Harris, identified with the company since its inception. Solomon Epstein, connected with the company for many years, will serve as executive vice president. Changes in personnel or policy are not contemplated.

Witco Chemical Company, observing its 35th anniversary this year, operates 12 wholly-owned or associated plants and 10 sales offices in this country and one plant and two sales offices in England.

• AEDC in New Location

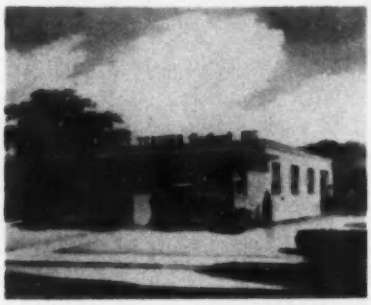
Atlas Electric Devices Co are now located at their new plant at 4114 North Ravenswood Avenue, Chicago 13, Illinois. The entire building is occupied by Atlas and is used for manufacturing, testing, and research work on Fade-Ometers, Weather-Ometers, Launder-Ometers, Atlas Scorch Testers, and the Atlas Accelerator.

• Du Pont Sets Up Central Finish Section at Kinston

Du Pont's Textile Fibers Department announced last month the formation of a central Finish Section at Kinston, N C, under the direction of Olaf A Bredeson.

The new section will be concerned with a broad study of finishes for man-made fibers and will have headquarters in the recently completed research laboratory for "Dacron" polyester fibers at Kinston.

Activities of the Finish Section will include the screening of new finishing materials for Du Pont's acetate, rayon, and nylon, as well as "Dacron" and "Orlon" acrylic fiber.



Artist's drawing of Scott Testers (Southern) Inc's new plant at Spartanburg, S C.

• Scott Testers to Occupy New Plant in Spartanburg

Scott Testers (Southern) Inc, which commenced operations in Spartanburg, S C, approximately two years ago as a Southern repair and service center for equipment manufactured by Scott Testers, Inc, of Providence, R I, is about to occupy a newly erected plant in the Carolina city.

A stock of parts is maintained at Spartanburg, as well as a staff of factory-trained service personnel, which is available for travel to plants in the South for on-the-spot repairs.

General manager at Spartanburg is John E Hargreaves. John Klinck continues as sales representative in the area.

• Kelco Moves to New Quarters in N Y

The Kelco Company, developers of algin products, last month moved its New York offices from 31 Nassau St to more spacious quarters at 120 Broadway to provide better service to its customers. Kelco has branch offices in Chicago and Los Angeles.

OBITUARY

EDGAR S KENNEDY

EDGAR SLOAN KENNEDY, 57, director of the Textile Research Department of American Viscose Corporation, died on January 23rd at Delray Beach, Fla. Mr Kennedy, who was vacationing with his wife, succumbed to a heart attack. Besides his wife, he is survived by four children.

Born in Pittsburgh, Pa, Mr Kennedy studied pre-law and liberal arts at Princeton University. After a period of time with Wildman Mfg Co, he joined American Viscose in 1926 as a salesman. He started the company's Service Department and eventually, in 1939, founded Avisco's Textile Research Department, which expanded under his direction to a 14-division research operation.

• Cravenette Appoints First Distributor

The Cravenette Company, U S A, Hoboken, N J, has announced that a licensing arrangement has been completed with Tri Supply Company, 2120 North Menard Avenue, Chicago, Ill, to represent the company's Drycleaners Division.

Tri Supply Company, headed by Ralph Margolis, has for many years served the drycleaning industry in Illinois, Indiana and Wisconsin. Previously, "Cravenette" water-repelling preparations available to the drycleaning and laundry industry only through the direct selling efforts of the company.

• Leeds and Northrup Contracts for $2,750,000 Plant

Leeds & Northrup Company, Philadelphia, has announced that the contract for construction of its new plant adjoining North Wales, Pa, approximately twenty-two miles from the heart of Philadelphia, has been awarded to Baton Construction Company, Philadelphia. The contract is for approximately $2,750,000. Occupancy is scheduled for next winter.

The plant proper reportedly will comprise 254,000 square feet on one floor, plus partial mezzanine, and be of brick, steel, and glass. Manufacturing space will occupy 216,000 square feet; office space, 24,000 square feet; and a 13,900 square-foot cafeteria will accommodate 400 persons at a meal.

Aside from the main plant and supplementary power plant buildings, six and a half acres of the 129-acre Leeds & Northrup tract will be taken up by parking lots for 900 cars with the remainder devoted to landscaping and recreational areas.

This new Leeds & Northrup development will produce such L&N equipment as the various types and models of Speedomax controllers, recorders and indicators, together with panels and cubicles for certain control applications, and possibly some other L&N products.

Approximately 1,300 of the firm's employees will man the new facility. Leeds & Northrup officials emphasize that the plant will not replace the long-established headquarters at 4901 Stenton Avenue and other properties in the Germantown section of Philadelphia.

• Glyco Office Removal

The executive and sales office of the Glyco Products Co, Inc, will be removed on March 1st to the Empire State Building, New York, N Y. The new telephone number is OXford 5-5140.

• Du Pont to Grant $291,000 to Colleges

A fund of $291,000 for grants to universities and colleges to help improve the teaching of science and mathematics was announced last month by the Du Pont Company as part of its $800,000 aid-to-education program for 1955-56.

There are three separate parts to the support of teaching, which is the most recent development in the company's program:

In the newest phase, $75,000 for summer and winter fellowships for master's degree training for high school science and mathematics teachers.

$125,000 to advance the teaching of chemistry in 50 privately supported institutions, mostly liberal arts colleges.

$91,000 for 24 postgraduate teaching assistantships in chemistry.

In its full program of aid-to-education, the company has authorized a total of more than $800,000 in grants for the 1955-56 academic year, as compared with over $700,000 for the present year. Under the longer standing plans, the company is granting $279,000 for fundamental research, $210,000 for postgraduate fellowships in science and engineering, and the balance for miscellaneous contributions.

Included in the authorization for research are grants-in-aid of $15,000 each to ten universities and $10,000 each to seven universities. These grants are to build up knowledge through the support of unrestricted fundamental research in chemistry. There are also summer research grants of $1,500 each to 16 other universities.

Under the long-established program of postgraduate fellowships in scientific fields, the company is awarding 57 for the next academic year. This includes 23 in chemistry, 17 in chemical engineering, six in biochemistry, five in physics, four in mechanical engineering, and two in metallurgy.

As has been the case in previous years, Du Pont is making the awards to selected colleges and universities and leaving decisions on detailed use of the funds up to them.

• 53rd Phi Psi Convention

In conjunction with its own 50th anniversary observance, Gamma Chapter, the Lowell Technological Institute affiliate of Phi Psi fraternity, will play host to the 53rd annual national convention of Phi Psi fraternity in April.

The 3-day affair will take place April 14-16 at the Hotel Beaconsfield in Brookline, Mass, with wives of members as invited guests.

A tour of the LTI campus will be featured on Friday afternoon. Among the guest speakers at the Saturday evening banquet will be LTI president Martin J Lydon.

Arlin, a new and highly reflective yarn, is being shown by John R Mitchell (left), head of the Arlin Manufacturing Co, to Earl F Cook, executive director of the Lowell (Mass) Development and Industrial Commission. The umbrella is made from material utilizing the decorative Arlin.

• Arlin Mfg Co Locates at Lowell

Arlin Manufacturing Company, makers of "Arlin," a new and highly decorative yarn, has begun to produce at its newly acquired plant in Lowell, Mass.

The new concern is headed by John R Mitchell, formerly with E I du Pont de Nemours & Co, Inc, where for the past six years he engaged in sales development and technical service activities.

Arlin yarn is said to be characterized by exceptionally high tensile strength, abrasion resistance and chemical inertness. It reportedly has outstanding thermal stability in temperatures from —76°F to 300°F. Although it is supplied as a transparent lustrous material, it is claimed that it can be piece-dyed at the boil for outstanding color effects. End-use potentials include fabrics for draperies, upholstery, dresses, jackets, millinery goods, shoes, pocketbooks, rainwear, etc.

• 1955 Chemical Progress Week

The second Chemical Progress Week has been scheduled for May 16-21 by the Manufacturing Chemists' Association, sponsor of the event.

"The purpose of the week," said William C Foster, MCA president, "is to bring home to the American people the significance of the chemical industry in terms of their daily life. Last year we feel we got off to a good start. This year we hope to do even better."

The board of directors of the MCA, made up of top-level industry executives, will serve as the sponsoring committee. The program will be national in scope with emphasis on local-level activities, particularly in chemical industry plant-communities.

The Manufacturing Chemists' Association is said to represent over 90% of the productive capacity of the chemical industry.

• NETF Launches New Scholarship Plan

A "new look" for New England Textile Foundation scholarships will become effective with scholarships awarded to students entering New England textile schools in September, 1955, according to Foundation officials. The revised plan is intended to equalize costs of textile education for scholarship students at the four schools in which such scholarship aid is available.

Starting with the Class of 1959, entering textile schools in the Fall of 1955, the gross amount awarded each scholarship winner will be adjusted to cover full tuition at the school of his choice, and will afford $250 toward other expenses.

Information on NETF scholarships is available from New England Textile Foundation, 31 Canal Street, Providence 3, R I.

• Research Lab Directory in Preparation

The National Academy of Sciences—National Research Council is now compiling the tenth edition of "Industrial Research Laboratories of the United States," a directory of American industries and businesses which maintain scientific research and development facilities.

The directory will include nongovernmental laboratories devoted to industrial research. *Research* for the purposes of this directory includes industrial development work on processes and products, as well as fundamental and applied research. Laboratories engaged primarily in routine testing and control but carrying on research activities as well will also be listed in the directory.

The directory will indicate the type of ownership or sponsorship of the laboratory (that is, whether it is company-owned, an independent commercial laboratory, a trade association laboratory, or a nonprofit foundation or institute). It will also indicate the kind of research activity performed and the nature of the services offered, such as research only for the parent organization, research on a fee or contract basis, consultation and advice, and testing and analysis.

The number of professionally trained members and technical personnel of the scientific research staff will be shown, as well as the number of additional employees.

Publication is scheduled for mid-1955. There is no charge for listing in the directory. Industrial laboratories that may wish to be included in the directory but have not received a questionnaire may do so by writing to James F Mauk, Staff Associate, National Academy of Sciences—National Research Council, 2101 Constitution Avenue N W, Washington 25, D C.

• March Activities of Quebec Section, CATCC

Arthur R Wachter, American Viscose Corp, will discuss "The Stabilization of Fabrics Containing Cellulosic Fibers" at the March 19th meeting of the Quebec Section, Canadian Association of Textile Colourists and Chemists. The meeting will be held at 7:30 pm in the Lecture Theatre in the Physical Science Center of McGill University, Montreal. A plant visit in the afternoon is also scheduled.

The third in series of four symposia on textile technology sponsored by the Quebec Section will be held one day earlier (March 18th) and feature a talk on "Fiber-Stresses and Deformation other Than Tensile". Joseph H Dusenbury, assistant director of research at the Textile Research Institute, Princeton, N J, will discuss torsional properties, bending modulus and bending fatigue, shear properties, loop strength and knot strength. This symposium will be held in Ciba Company's Conference Room, 1235 McGill College Ave, Montreal, beginning 7:30 pm.

• PSU Offering Graduate Assistantships in Textile Research and Teaching

The College of Home Economics at the Pennsylvania State University is offering graduate assistantships in both textile research and teaching which are open to graduates of accredited colleges with good scholastic standing and a good background in the natural sciences, particularly chemistry.

Half-time graduate assistants receive $1180 for the academic year, work 20 hours per week and are allowed to carry 10 credits per semester. One-quarter and three-quarter time assistantships are also available.

Application forms may be obtained from the dean of the College of Home Economics at State College, Pa. Processing of applications begins on March 1. Applications received after that date will be considered only for any unfilled positions.

• Interest in Textile Courses Remains High at LTI

Despite the many new courses which have been added, the textile curriculum is retaining its interest among students at Lowell Technological Institute.

A breakdown of enrollment figures by course registration reveals that the heaviest enrollment is in textile chemistry, which numbers 100 students, and in textile engineering with its manufacturing and engineering options, numbering 190 students. The textile manufacturing course has 80 registrants, while 39 students are in textile sales and management; 13 in graduate textile chemistry; 12 in graduate textile engineering; and 36 special students in textile courses, making a total number of 470 in textiles out of a total day enrollment of 677.

These aggregate figures include registrations in the newly-integrated textile manufacturing course and in the formerly separate cotton, wool, synthetic, and design courses.

In the department of electronics engineering, which was instituted last year, students number 88, while paper engineering has 71 enrollees; leather engineering, 15; and the brand-new plastics engineering program, 33.

The National Council for Textile Education in a recent statistical report listed Lowell Tech as either first or second in the enrollment of textile students, depending on the definition of textile courses, and LTI holds second place in American textile colleges for its female enrollment, this year numbering 23 young women.

By far, this year's freshman class has favored the various textile chemistry, manufacturing, and engineering courses with a textile enrollment of 142 in a class of 293. Second highest course enrollment among freshmen is electronics engineering with 72, and 39 are in paper engineering, 33 in the plastics course, which was established only this past semester, and seven in leather engineering.

• PTI Scholarship Awards

Winners of scholarship awards totaling $28,000 at the Philadelphia Textile Institute were announced recently by Dean of Students Donald B Partridge.

The announcement covered twenty-six industrial scholarships and five regional scholarships. Recipients are as follows:

Industrial Scholarships

	Class
Arthur Besse Memorial	
Sherwin L Neugeboren	1956
Edwin Sielewicz	1957
Leon Birnbaum	
Bruce Talley	1955
Collins and Aikman	
Joseph Wagner	1957
Archibald Holmes	
Joseph Reuter	1958
Hubshman Foundation, Inc	
Harry Freedman	1957
Sheldon Zaretsky	1957
A M Karagheusian, Inc	
Walter Foster	1955
Donald Glovich	1957
Magee Carpet Co	
Thomas Cox	1958
Mohawk Carpet Mills, Inc	
Paul Goda	1957
Owens Corning Fiberglas Corp	
Joseph Owens	1956
Richard Root	1955
Berthold Strauss	
Gordon Orlow	1957
R L Quinn	
Wallace Nuttal	1955
Sylvan I Stroock	
Jordan Dannin	1956
Sheldon Sonkin	1956
Shenandoah Valley Textile Executives Association	
Elwin Penski	1957
Textile Salesmen's Association, Inc (N Y)	
Ivan Goodman	1957
Ronald Hammer	1956
Donald Rubin	1955
Eugene Sterling	1957
United Merchants and Manufacturers	
Valdeman Folkmanas	1956
Jacques Weber Foundation, Inc	
Carl Carlson	1957
Edward Harris	1957
American Viscose Corp	
Anthony Cartagine	1955

Regional Scholarships

Charles Baker	1958
Stanley Cear	1956
Charles DeGreen	1958
Saverio E Russo	1958
Donald Stogo	1958

A new scholarship given by the Textile Veterans Association, New York, to be known as the Charles W Carvin Sr Scholarship will be awarded this semester.

• NYPC Elects New Officers

The New York Pigment Club, at its 2nd Annual Meeting on January 15th at New York's Park-Sheraton Hotel, elected Robert J O'Brien of Collway Colors, Inc, president. Other new officers include: *vice president*—Emil A Wich, General Dyestuff Co; *secretary*—Hans A Kahn, Max Marx Color & Chemical Co; *treasurer*—Justin B Arnold, Paul Uhlich & Co.

The board of governors consists of Robert E Brouillard, General Aniline & Film Corp; Samuel S Harkavy, Geigy Chemical Corp; Herbert Johnson, H Kohnstamm & Co, Inc; Aaron Permut, Aula Chemicals, Inc; Lyde S Pratt, consultant; and Casper Smith, Smith Chemical & Color Co, Inc.

Highlighting the Annual Meeting, which saw the club accept its 100th member and its first international members, was a dinner-dance attended by 70 persons.

At the meeting held February 10th at Fraunces Tavern in New York, the Club was addressed by Louis Wolff and Clyde S Marlatt, president and secretary of the Dry Color Manufacturers' Association. Their topic was the role of the organic pigment industry in the 1956 Perkin Centennial celebration.

• Avisco Acetate Section

The recently established Acetate Section in the Research and Development Division of American Viscose Corporation at its Marcus Hook, Pa, research center is the first product section to be formed in the reorganization of AVC's research and development program. It is understood that other sections will be established for each product, such as rayon textile yarns, rayon staple, and rayon tire yarn.

John A Howsman, the leader of the new section, was formerly assistant leader in the Cellulose Section. He also served for a time last year as acting leader of the Yarn Finish Section.

• NEW PRODUCTS AND DEVELOPMENTS •

• Hold "Azomatic Solutions" Simplify Diazotization

Augusta Chemical Co, Augusta, Ga, originators of a new series of products now available under the trade-mark of "Azomatic Solutions," announce that these concentrated base formulations, which they point out are "dependable and stable," will help eliminate some prevalent problems encountered by yarn and fabric dyers.

Augusta has filed for a patent on its new products used in the diazotization step in the preparation of fast, vivid colors for dyeing or printing.

"The new products finally simplify the process of diazotization to a great degree," according to Henry I Gilbert, president of Augusta Chemical Co, "because dyers and printers of textiles now need merely stir the required quantity of 'Azomatic Solution' into acidified cold water and, in a matter of seconds, they have a concentrated, tar-free diazo. No nitrite, no stabilizers or materials other than the acid are necessary. The nitrite required for complete diazotization is part of the solution in which there is an exact balance of base and nitrite."

"We were encouraged to start the lengthy experiments which resulted in 'Azomatic Solutions,'" Mr Gilbert explained, "because it is no secret that the diazotization of bases has always been a frequent source of trouble to fabric dyers and printers, especially in the matter of obtaining a complete diazotization and a clear, concentrated solution ready for use. To some extent, the difficulties encountered were partly solved, some years ago, with the introduction of stabilized diazo salts known in the trade as fast color salts. These are produced by diazotizing the base and then reacting it with a substance capable of precipitating the diazo salt in the form of a solid compound somewhat more stable than the diazo itself. These Fast Color Salts are powders that dissolve rather slowly in water to form diazo solutions of the corresponding base."

"Unfortunately, however, these diazo salts are not very stable," Mr Gilbert continued. "Some can be stored for a fairly long time but all deteriorate and decompose on standing, some very quickly. Furthermore, diazo salts are damaged and decomposed by heat, moisture and humid air. These decomposition products form a tarry scum when the fast color salt is dissolved in water. The tarry matter causes defects in dyeing and textile printing and must therefore be strained off. Besides the serious loss in time and difficulties in straining, the decomposition continues during prolonged runs with fast color salts or when the powdered bases, in the form heretofore available, were used."

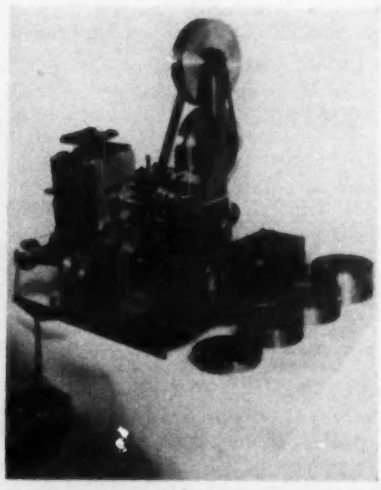
Mr Gilbert reports that his company's research was followed up with extensive field-tests in actual runs on yarns as well as on piece goods by some of the country's largest dyeing and printing firms. In addition to providing ready-for-use solutions, the new series of products reportedly affords better penetration and greatly improved fastness to crocking, thereby helping to avoid "seconds" and "rejects". It is claimed that, because the new series assures uniform diazos, shades are brighter, cleaner, deeper, and can always be duplicated. Because there are no decomposition products or undiazotized base left with the use of "Azomatic Solutions," there is also a great saving in clean-up time.

• New Series of Pad Colors

Pad Dye Corporation, 65 Crosby Place, Paterson, N J, early this month introduced a new series of Pad Colors, which are said to make it possible to pad acetate fabrics in the greige without detergents or penetrating agents. The colors are said to completely eliminate shading and tail-off.

Of the water-soluble type, the Pad Colors are said to be ideal for use on acetates and nylons in either pad-hot water or pad-steam systems.

According to the manufacturer, the following colors are currently being used in production quantities: blue BS and GS, yellow GS, orange 3RS, scarlet BS, red RS and rubine BBS.



CSL-A Abrador, marketed by Custom Scientific Instruments, Inc, Arlington, N J, determines the resistance to abrasion of flat surfaces of material, measured in terms of volume loss. (See description on page 94 of previous issue).

• New Emboset Resins

Metro-Atlantic, Inc, Centerdale, R I, has added two new products to its line of Emboset resins—Emboset Loclor and Emboset NR3. Both products are said to keep yellowing and tensile strength losses at a minimum.

Emboset Loclor is a low-chlorine-retentive resin designed to produce crush resistance and stabilized effects on cotton and rayon. Its high stabilizing efficiency is said to make it an excellent product in the production of embossed and glazed chintz effects on cotton. The manufacturer recommends its use on fabrics which are to be subject to bleaching as well as washing. It is said to possess high shelf life, and to be very stable and easily diluted in water. It runs with no foam.

Emboset NR3 is an improvement over Emboset NR (see page 19A) in the respect that there is very little free formaldehyde liberated in the processing and from the goods in an unwashed state. This liquid resin is said to produce crease resistance, shrinkage control and firmness on hydrophobic fibers. It is claimed to be especially efficient on heavy nylon shoe cloth, and for sheer nylon blouse fabric where a firm resilient hand is desired. It is said to be very economical and easy to run and cure. Other features are its high shelf life and good durability to washing and dry-cleaning.

Garment tags will be available at the customer's request.

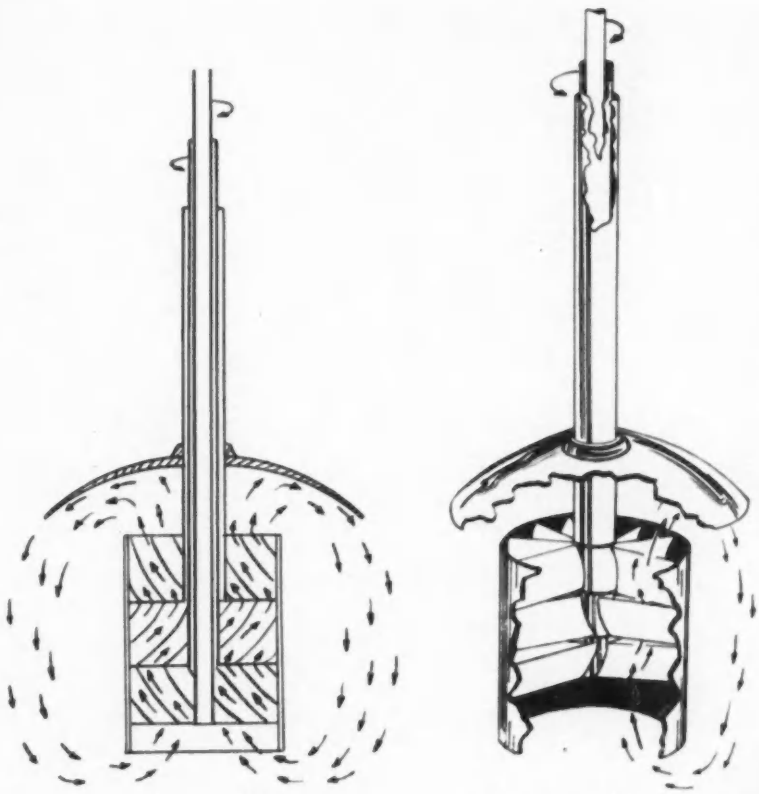
• Plasticol

A new additive which adds plasticity and flexibility to starch sizing compounds is now being manufactured and sold by Pioneer Chemical Works, Philadelphia.

This product, tentatively called Plasticol, was developed by the National Sugar Refining Company, and Pioneer has been designated as the sole licensee. It is a synthetic sugar resin in liquid form, light yellow in color and is said to be completely soluble in water.

It is claimed that powdering off is reduced at the loom and wearing qualities of yarns improved by Plasticol. It is also said to reduce friction by aiding lubrication, has excellent moisture control qualities under varying conditions of humidity, is nontacky, and has natural humectant properties.

Requests for samples of Plasticol should be accompanied by a statement of the particular problem and conditions, and should be sent to Pioneer Chemical Works, Inc, 940 N Delaware Avenue, Philadelphia 23, Pa, Dept-S.



Detailed Drawings of Shear-Flow Industrial Mixer

• Shear-Flow Industrial Mixer

The Shear-Flow Industrial Mixer, a portable unit manufactured by Gabb Special Products Division of The E Horton & Son Co, Windsor Locks, Conn, consists of two impellers and a stator spaced closely together. The two impellers turn in opposite directions and create a pumping action which moves the material from the bottom upward through the veins of the stator. Because the impellers turn in opposite directions with a very small space between, a shearing action takes place which breaks up and disperses any particles which are present.

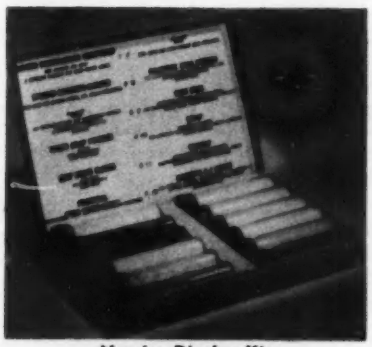
R S Cooper, president of the company, recently stated that he believed the new mixer would speed up many mixing operations, and in some instances, he states, the mixer has already shown that it can do the job of considerably more expensive equipment.

Gabb Special Products invites processors to submit sample batches for mixing.

• Compact Sample Kit

To aid jobber and distributor salesmen of soap products and cleaning compounds, National Milling and Chemical Co has created an outstanding visual presentation in the form of a compact sample kit, which shows 12 actual samples of some of the company's products with a descriptive chart affixed in the lid that thoroughly explains the properties of the various Namico products displayed.

These kits will be supplied to qualified jobbers and distributors of soaps and cleaning compounds upon request. Write for full particulars to National Milling and Chemical Co, 4601 Nixon Street, Philadelphia 27, Pa.



Namico Display Kit

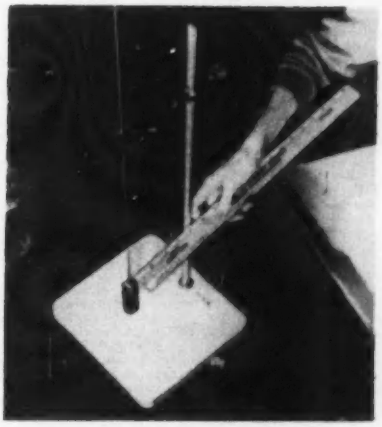
• "Thiokol" Liquid Polymer Emulsions

Methods of preparing stable, water-based emulsions from "Thiokol" liquid polymer have recently been developed by the Thiokol Chemical Corp, 780 N Clinton Avenue, Trenton, New Jersey. The emulsions are of fine particle size and are potentially suitable as binders and impregnants, among their other applications.

The dispersed "Thiokol" liquid polymer is described as an organic polysulfide polymer that can, if desired, be cured to a resilient rubber with excellent oil and solvent resistance; good aging characteristics; impermeability to gases and moisture; and excellent low temperature properties.

Preparation of the emulsions is accomplished in a colloid mill. Cationic, anionic and nonionic types with solids contents ranging up to 40 percent can be simply prepared, it is claimed. Dispersed liquid organic peroxides function as curatives either after exhaustion of the aqueous phase or as a component of a coagulating system.

A bulletin describing the preparation and curing of "Thiokol" liquid polymer emulsions is available on request.



FSC Lab Support Stand

• Improved Lab Support Stand

For chemists engaged on one-burette titrations with fugitive endpoints, Fisher Scientific Co, 717 Forbes St, Pittsburgh, Pa, offers a new square (9" x 9") white support stand.

The stand is said to provide an excellent background for viewing changes in an indicator, and the danger of a vessel's teetering on the rim of the titration stand is offset by the ample space from aluminum support rod to front. The distance from support to apparatus is the standard 4½". The center of gravity of the load is directly over the middle. Four rubber feet prevent slipping.

Price: $6.00.

TECHNICAL LITERATURE

(This is an alphabetical list of some of the outstanding technical literature which has appeared recently. Unless otherwise indicated any literature appearing in this listing may be obtained free of charge from the supplier upon written request.)

A NEW, PORTABLE LAB DRYER BY SARGENT——*C G Sargent's Sons Corp, Industrial Dryers Div, Graniteville, Mass*——This bulletin (No. 204) gives a concise resume of the outstanding features of their new portable lab dryer. (See description of unit on page 92 of the previous issue of ADR).

AGILON* STRETCH YARN —— *Deering Milliken Research Trust, Pendleton, S C*—— This booklet, which covers the properties and applications of Deering Milliken's new stretch yarn, describes it as "a new and versatile non-torque elasticized nylon filament yarn and combination yarns consisting of elasticized nylon yarn and other textile materials, especially cotton".

According to the booklet, the new yarn is adaptable to the manufacture of women's hosiery, men's and boys' hosiery, body-knit fabrics, tricot fabrics and various woven fabrics.

* Trademark

BOROTHERM——*American Potash & Chemical Corp, 122 East 42nd St, New York 17, N Y*——This is a detailed informational booklet on the recently introduced fire-resistant material, Borotherm.

The booklet includes a listing of suggested uses in various industries and also includes information on formulations as a result of research at American Potash & Chemical Corporation.

Other subjects covered are the low cost factor of Borotherm, good washability properties, and fire test information.

CELLOSOLVE AND CARBITOL SOLVENTS (F-4765)——*Carbide and Carbon Chemicals Co, 30 East 42nd St, New York 17, N Y*—— This booklet describes in detail the nine commercial glycol-ethers sold by the Company.

An important feature is a section devoted to the specifications of the glycol-ethers and the test methods used by Carbide to check these specifications. These laboratory control tests comprise some of the standard ASTM methods, and other methods that have been specially developed in the Company's laboratories.

INVESTIGATION OF IMPACT LOAD ABSORPTION THROUGH SUSPENSION LINE ELONGATION——*Wright Air Development Center (1952); 232 pages, with maps, charts, tables and equations. Available from OTS, U S Department of Commerce, Washington 25, D C (Room 6227, Commerce Building.) $2.50. Code No of Report, PB 111239*——Tests and evaluations of five different types of parachute suspension line cord are described in this Air Force research report. Both 24- and 30-foot parachutes were used in these tests, in which varying loads and launching speeds were simulated. Suspension lines studied include standard cord, two types of nylon cord, fortisan cord, and formic-acid-treated cord. Charts and text detail the effects of elongation, construction and material on the shock absorbing capacity, strength and durability of the various lines. There are over 150 porosity-measurement diagrams. Photographs of test equipment and methods are included (BTR Vol 21, No 6, p 187.)

MECHANICS OF ELASTIC PERFORMANCE OF TEXTILE MATERIALS: RELATION OF CERTAIN GEOMETRIC FACTORS TO THE TEAR STRENGTH OF WOVEN FABRICS——*U S Quartermaster Corps; 61 pages, with diagrams, graphs, and tables; available from OTS, U S Department of Commerce, Washington 25, D C (Room 6227, Commerce Building.) $2.00. Code No. of Report, PB 111409*——Fabrics with a higher tear strength are the goal of this research into the mechanism of tear. The report describes and gives the results of tongue-tear tests on a variety of acetate fabrics in which certain controlled factors are varied: weave, texture, yarn twist and yarn structure. It also discusses the influence on tear strength of various types of fabric distortion at or near the tear: yarn pull-out force, crimp, cover factors, and dimensional stability in the plane of the fabric. The relationships between these types of distortion and the variable fabric factors are examined, and the "mechanism of tear" is investigated theoretically and correlated with the test findings. (BTR Vol 22, No 3, p 137.)

MONAMINE ADD-100——*Mona Industries, Inc, Chemical Division, Paterson 4, N J*—— This bulletin (#217) contains details and specifications on Mona's new synthetic detergent of the alkylolamide type, which has a light yellow color, and is said to be practically odorless.

MUCH MORE THAN MEETS THE EYE—— *L Sonneborn Sons, Inc, 300 Fourth Ave, New York 10, N Y*——With many pictures and a minimum of technicalities, Sonneborn tells the story of how and where their products are used. ——36 pages.

PERMA KLEER 80 —— *Refined Products Corp, Lyndhurst, N J*——New and additional information on Perma Kleer 80, Refined Products Corp's brand of sequestering agents, is contained in this booklet. These have proved to be an outstanding new development in water treatment for textile and other use.

The following facts concerning Perma Kleer 80 are described:

1) Chelating power for ferric ion over the entire pH scale with special emphasis at the range 7 to 11 where values are 4 or more times greater than ethylene diamine tetra acetic acid.
2) Formation of the ferric chelate in the pH range 7 to 11.
3) Additional chelating ability for calcium, magnesium and other metallic ions.
4) Broad range chelation. One product to inactivate all interfering metal ions.
5) Solubility of Perma Kleer 80 in acid or alkaline media.
6) Stability of the compound and its chelates.

POLYFON-SODIUM LIGNOSULFONATES—— *Tech Bull #301, Polychemicals Div, West Virginia Pulp and Paper Co, Charleston, W Va* ——The promising surfactant uses of these five grades of sodium lignosulfonates include those in the dispersion of organic and inorganic pigments, and in the dispersing of cellulose acetate, vat and sulfur dyes.

According to the Polychemicals Division, the process of manufacture permits control of the extent of sulfonation of the Polyfons. Grades currently offered are of standardized sodium sulfonate group content ranging from 5.8 to 32.8 percent, but intermediate grades can be made on special request.

All grades are brown free-flowing amorphous powders. They reportedly can be stored indefinitely either dry or in solution without mold growth or fermentation. They are said to be soluble in water, giving alkaline solutions.

1955 REFERENCE GUIDE —— *Dow Corning Corp, Midland, Mich*——This catalog, which is devoted to the silicones, is twice the size of last year's. It lists some 23 new products besides the 100-odd mentioned in the previous issue.

Still retained is the "division by application" method of listing the individual products. This application index has been increased from 17 to 21 classifications.

Comparable data on various silicone products and the organic materials they displace are also given to permit preliminary evaluation.

TERTIARY-ALKYL PRIMARY AMINES—— *#5P-33, Rohm & Haas Co, Special Products Dept, Washington Sq, Philadelphia 5, Pa*—— This bulletin deals extensively with Rohm & Haas' line of tertiary-alkyl primary amines, i e, Teriary-butylamine, Tertiary-octylamine, Primene 81-R, Primene JM-T, and Primac JMA-T. Contents include Physical Properties, Chemical Properties, Suggested Applications, and Chemical Reactions.——31 pages.

THE TOXICOLOGY OF ACRYLONITRILE—— *American Cyanamid Co, Petrochemicals Dept, 30 Rockefeller Plaza, New York 20, N Y*—— Contains abstracts of the more important experimental data, both from published literature and the Company's files. The 16-page booklet also contains a section on the treatment of persons who have been exposed.

Dr Donald O Hamblin, Cyanamid's medical director, and Dr Harold H Golz, assistant medical director, said in the booklet's summary, "although acrylonitrile is toxic by ingestion, by absorption through the unbroken skin and by inhalation, the studies summarized in the report show that exposures to the compound are not as hazardous as has been supposed. . . . Human experience with acrylonitrile has been uniformly good. No industrial case of serious poisoning has come to our attention to date. Such a favorable record may be attributed in large measure to the care with which the compound has been handled."

TRITON X-100——*Rohm & Haas Co, Washington Sq, Philadelphia 5, Pa*——This booklet, No T-16a, is a recent revision of a publication originally issued several years ago, and it contains new data of interest relative to Triton X-100, a highly concentrated detergent and wetting agent. Contents include Uses, Chemical Constitution, Properties, "In the Wool Industry," Rayon and Cotton Wet Processing, and Special Applications.——16 pages.

TWITCHELL 7421 OIL——*Emery Industries, Inc, Dept S, Carew Tower, Cincinnati 2, O*—— Twitchell 7421 Oil, an antistatic lubricant for use in processing woolens, worsteds and blends, is described fully. The booklet interprets results of a comprehensive evaluation of Twitchell 7421 Oil with eight competitive medium priced wool and worsted oils. Performance factors given particular emphasis in this comparison include static control, scourability, lubricity and resistance to yellowing.

VYDUL TECHNICAL BULLETIN —— *Vikon Chemical Co, 1384 Massachusetts Ave, Cambridge 38, Mass*——Contains information on a new type of delustrant for nylon tricot fabric. The Vydul products are cationic resin dispersions which can be exhausted in a dye beck or padded. They are said to produce a finish resistant to yellowing and with excellent durability to washing.

GENERAL CALENDAR

AMERICAN SOCIETY FOR TESTING MATERIALS

1955 Annual Meeting—June 26-July 1, Chalfonte-Haddon Hall, Atlantic City, N J.

CANADIAN ASSOCIATION OF TEXTILE COLOURISTS & CHEMISTS (Quebec Section)

Symposia: Mar 18, Apr 15 (Ciba Company's Conference Room, Montreal, Que).

Regular Meetings: Feb 19, Mar 19 (McGill University, Montreal, Que).

DRYSALTERS CLUB OF NEW ENGLAND

Apr 28 (Hotel Vendome, Boston, Mass); June 24 (Outing—Wachusett Country Club, W Boylston, Mass).

THE FIBER SOCIETY

Spring Meeting—May 4-5, 1955, Alabama Polytechnic Institute, Auburn, Alabama.

Fall Meeting—Sept 8-9, 1955, Massachusetts Institute of Technology, Cambridge, Mass.

NATIONAL COTTON COUNCIL OF AMERICA

Cotton Research Clinic—Feb 16-18, Pinehurst, N C.

1955 Chemical Finishing Conference—Sept 20 21, Chalfonte-Haddon Hall, Atlantic City, N J.

TAPPI (Metropolitan District)

Mar 8, Apr 12, May 10 (Fraunces Tavern, New York).

TEXTILE RESEARCH INSTITUTE

25th Annual Meeting—March 10-11, Hotel Commodore, New York, N. Y.

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ABSTRACTING SERVICE—Abstracting and digesting of foreign patents and periodicals. Literature review and special reports in dyestuff and cellulose chemistry. PAUL WENGRAF, 88-36 ELMHURST AVENUE, ELMHURST 73, NEW YORK.

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PLANT CHEMIST OR DYER'S position wanted by chemist with diversified background in dyeing and finishing synthetics. Have experience as laboratory director, dyer, finisher and assistant superintendent. Prefer metropolitan New York, northern New Jersey, or abroad. Write Box No. 830.

POSITION WANTED: For manager or high supervisory-chemical engineer graduate. Experienced in finishing plant operations, nitrocellulose formulation and coating, vinyl coating. Extensive background in handling personnel; safety and embossing. Write Box No. 834.

WANTED: CHEMIST—excellent opportunity in progressive dyehouse—North Jersey. Write Box No. 836.

POSITION WANTED: Textile Chemist and Dyer. Extensive finishing and laboratory experience. Seeks connection in process development, technical representation, or highly responsible supervisory position in dyeing and finishing plant. Write Box No. 819.

POSITION WANTED: Chemist, with background in dyeing, finishing, spinning, knitting and weaving. 19 years' experience in textile industry, 6 years as manager of technical service department of dyestuff manufacturer. Desires executive position with dyestuff or new fiber industry in United States or Canada. Age 38. Write Box No. 831.

DYER OR ASSISTANT DYER WANTED, with background in dyeing skein yarn and/or sweater piece dyeing. Write Box No. 838.

POSITION WANTED: GROUP LEADER — 11 years' experience in dye, textile auxiliary, and intermediate synthesis and application. Many successful products. Patents. Desires position of increased responsibility. Address replies to Box No. 839.

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WANTED: TEXTILE CHEMIST—Excellent opportunity for bright young man with technical background; to take full charge of our laboratory; will be trained for sales. Write Box No. 846.

● Classified Advertisements ●

POSITION WANTED: As dyer or dyer chemist-colorist. Over 20 years' experience dyeing and finishing of cotton, synthetic and wool piece goods. Worked as chief chemist, dyer, finisher, in charge of research laboratory for dyestuff application. Textile chemist. College education. Will consider offer anywhere. Write Box No. 841.

TEXTILE CHEMIST WANTED—Established manufacturer of Chemical Specialties in the Philadelphia area, requires a chemist for development and evaluation of textile auxiliaries. Experience and advanced training desirable. Please give details of education, experience and salary requirements. Write Box No. 842.

POSITION WANTED: Pigment-emulsion consultant. Extensive experience in textile pigment printing. Seeks dyestuff or textile chemical manufacturer who is interested in water-phase pigment printing. Offers a complete line of colors and auxiliaries. Write Box No. 843.

POSITION WANTED: Dyer-Chemist, college graduate. Interested in quality and production control, liaison. Good theoretical and practical background in most phases of textile processing. Diversified mill and laboratory experience. Also have supervisory experience. Write Box 847.

WANTED: Textile Chemist—Textile Chemist to fill position as assistant plant chemist with progressive textile company located in Northern Virginia. Recent Textile School graduate, Vet or Guardsman preferred. Write Box No. 849.

TECHNICAL SALES REPRESENTATIVE—for a major textile pigment manufacturer. Plant or sales experience in pigment printing preferred. Location, Northeast. Write Box No. 848.

POSITION WANTED: L.T.I. graduate. Over 15 years' experience in dyestuff industry in sales, service and management. Desires responsible position requiring administrative and technical ability. Write Box No. 844.

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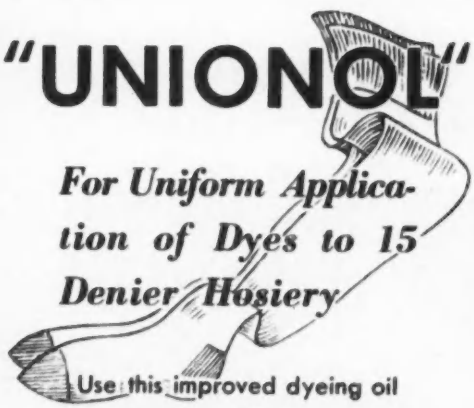

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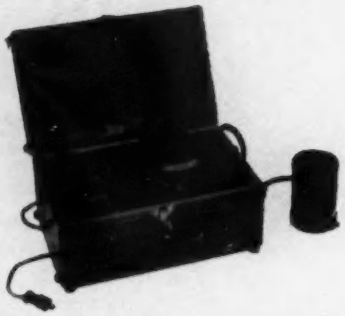

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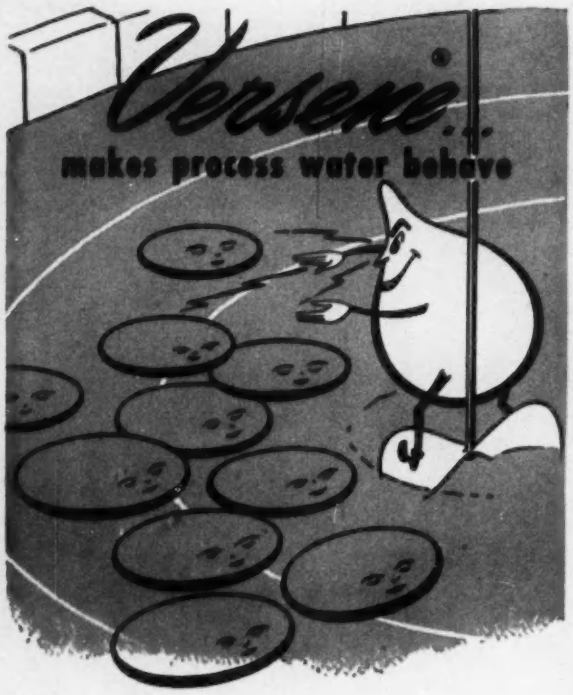

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Morton Salt Co.	
Mutual Chemical Co. of America	
National Aniline Division, Allied Chemical & Dye Corp.	5A
National Milling & Chemical Co.	55A
National Starch Products	34A
Naugatuck Chemical Div. of U. S. Rubber Co.	
Nopco Chemical Corp.	59A
Nova Chemical Corp.	
Nyanza Color & Chemical Co., Inc.	
Olin Mathieson Chemicals Corp. Industrial Chemicals Div.	
Onyx Oil & Chemical Co.	47A
Oronite Chemical Co.	36A
Pabst Sales Co.	49A
Pad Dye Corp.	22A
Perkins & Sons, Inc., B. F.	
Pfister Chemical Works, Inc.	46A
Pharma Chemical Corp.	44A
Philadelphia Quartz Co.	
Photovolt Corp.	54A
Pittsburgh Coke & Chemical Co.	
Procter & Gamble	10A
Reading Scientific Co.	
Refined Products Co.	Second Cover
Rohm & Haas Co.	39A
Royce Chemical Co.	
Rumford Chemical Works	23A
Sandoz Chemical Works, Inc.	
Scholler Bros., Inc.	57A
Seydel-Wooley & Co.	51A
Sherwin-Williams Co.	
Sims Metal Works	
Sirrine Co., J. E.	54A
Smith, Drum & Company	16A, 17A
Solvay Process Division, Allied Chemical & Dye Corp.	28A
Standard Brands, Inc.	55A
Standard Chemical Products, Inc.	
Stein Hall	55A
Swift & Company	33A
Taylor Instrument Companies	
Tennessee Corporation	
Tex-Chem Co.	
Union Carbide & Carbon Corp., Carbide & Carbon Chemicals Co.	37A
U. S. Rubber Co., Naugatuck Div.	
Van Vlaanderen Machine Co.	
Verona Dyestuffs	
Versenes, Inc.	58A
Victor Chemicals	
Virginia Smelting Co.	18A
Wallerstein Co., Inc.	
Warwick Chemical Co.	
Westvaco Chem. Div., Food Machinery & Chemical Corp.	
Wica Chemicals, Inc.	32A
Wiesner-Rapp Co., Inc., The	43A
Wolf & Co., Jacques	
Wyandotte Chemicals Corp.	
Young Aniline Works, Inc.	54A
Zinsser & Co., Inc.	50A

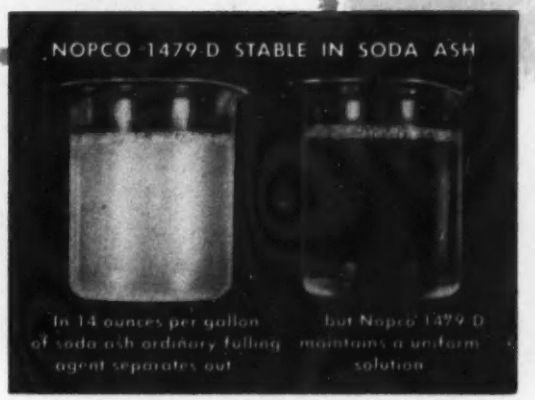
CARBONIZING

NEUTRALIZING

RINSING

FULLING

NOW Eliminate two steps between carbonizing and fulling


NOPCO 1479 D STABLE IN SODA ASH
In 14 ounces per gallon of soda ash ordinary fulling agent separates out
but Nopco 1479 D maintains a uniform solution

You've been asking for it for years. And now Nopco offers you, in Nopco® 1479-D, a fulling agent so tolerant to high amounts of soda ash that you can go straight from carbonizing to fulling—no need for neutralizing and rinsing.

Nopco 1479-D not only remains stable in soda ash solutions up to 14 oz. per gallon, but is not salted out by the sodium sulphate formed by the carbonizing acid and soda ash.

Also, since Nopco 1479-D works effectively either in neutral or alkaline solutions, it can be used for fulling greige goods as well as dyed pieces.

This is by no means its only advantage. The fact that Nopco 1479-D is 83% solids means important savings to you in labor and freight.

Other advantages of Nopco 1479-D

1. Good wetting and penetration of heavy fabrics
2. Rapid solution in warm water (120° to 140° F.)
3. Thorough rinsing in less time
4. Unaffected by hard water
5. High calcium tolerance (from pulled wool stock)
6. Excellent emulsifier of processing oils

Since the amounts of detergent and alkali depend upon the type of goods, the hand desired, and other factors, the Nopco technical service will gladly recommend the fulling formulation best suited to your operation. Write for full information on this time-and-cost-saving detergent today.

Nopco Chemical Company, 112 Fuller St., Harrison, N. J.

NOPCO

PLANTS: Harrison, N. J. • Cedartown, Ga. • Richmond, Calif.

...from a free-hand sketch and a scale model

It's the world's largest warp mercerizing range . . . and it all began with a free-hand sketch and a scale model whittled out of wood.

It takes seconds to tell it . . . but the engineering that made the new Coats & Clark range so successful is based on 130 years of machine-building experience. In August 1954, when the new Butterworth range was put to its severest test at maximum stretch and speed, results justified the months of tedious design and construction.

Coats & Clark's new thread mercerizer has finer controls, more precise adjustment and greater capacity than any such range built to date.

Whether you want a finishing range or a single machine — if your problem calls for complete cooperation between machine-builder and your own engineering staff — talk to a Butterworth man. Write us today.

H. W. BUTTERWORTH & SONS CO.
Bethayres, Pa.

1211 Johnston Building, Charlotte, North Carolina
187 Westminster Street, Providence, Rhode Island
Representatives in Principal Cities of the World.

BUTTERWORTH

Now LANASEAL!

(Combines best advantages of NYASEAL and LANOLIN)

improves dulling . . . has superior boarding properties

Fancourt's new LANASEAL imparts a superior quality to all nylons. Combining the best advantages of NYASEAL and LANOLIN, LANASEAL adds a new comfort and beauty to nylons.

LANASEAL, when used with other VIBRALON finishes, provides these advantages:

- **IMPROVES DULLING**
- **MAKES BOARDING EASIER**

When used on either the Dunn System or on conventional boarding, LANASEAL makes pairing easier. When used with belt or tray drying, LANASEAL eliminates sticking.

For more details on LANASEAL and what it can do for you, write or call Fancourt today.

VIBRALON

This Fancourt development has an amazing record of increasing the value of nylons. It provides greater snag and pick resistance for longer and harder wear; it imparts a pleasing softness and comfortable elasticity; it gives nylons a permanent matte-dull beauty; it provides a natural fibre warmth that guards against winter weather and summer clamminess.

W. F. FANCOURT CO.

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SOLVING FINISHING PROBLEMS SINCE 1904

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The vat orange preferred for fastness and level dyeing

Calcosol* Golden Orange 3G Paste

This vat orange offers the good light fastness and non-tendering qualities essential for such fabrics as curtains, draperies and upholstery.

CALCOSOL GOLDEN ORANGE 3G PASTE insures good level dyeing and is widely used in combinations to achieve many light to medium shades. These include maizes based on Calcosol Fast Yellow Paste and Calcosol Fast Yellow GL Paste; also tan shades based on Calcosol Brown R Paste and Calcosol Brown G Paste.

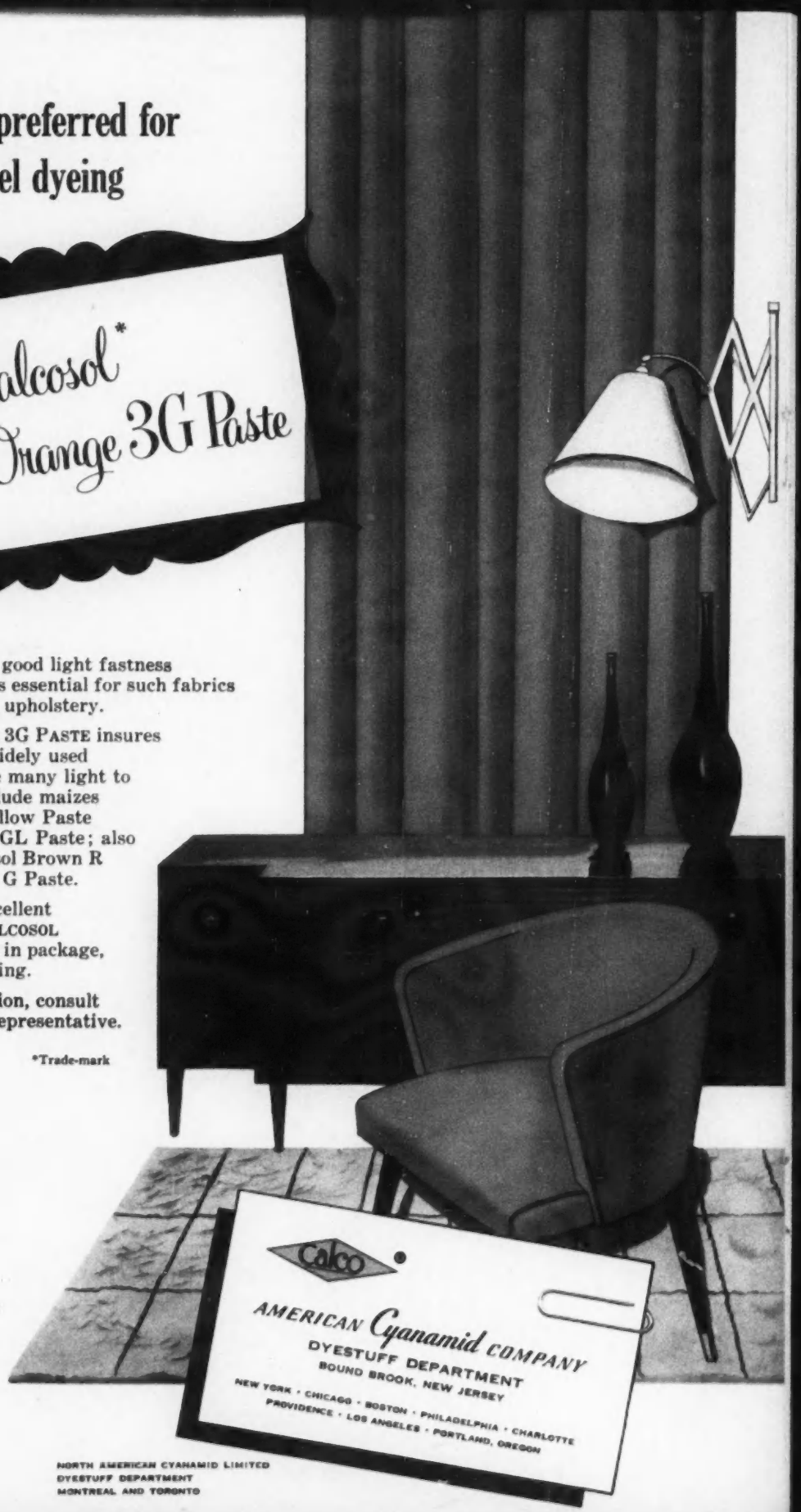
You'll benefit from the excellent working properties of CALCOSOL GOLDEN ORANGE 3G PASTE in package, beam, cheese or skein dyeing.

For samples and information, consult your Cyanamid Dyestuff representative.

*Trade-mark

Fastness Properties

Light	
Light shade	6
Heavy shade	6-7
Wash Test No. 4	5
Mercerizing	5
Chlorine	5
Peroxide	4-5
Water Spotting	5
Hot Pressing	5
Artificial Light	4R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